No. 24-1098

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

BRITA LP,

Appellant,

v.

INTERNATIONAL TRADE COMMISSION,

Appellee,

ZERO TECHNOLOGIES, LLC, CULLIGAN INTERNATIONAL CO., VESTERGAARD FRANDSEN INC., D/B/A LIFESTRAW, KAZ USA, INC., HELEN OF TROY LIMITED,

Intervenors.

Appeal from the United States International Trade Commission in Investigation No. 337-TA-1294

BRITA LP'S NON-CONFIDENTIAL OPENING BRIEF

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MARCH 15, 2024

Claim 1 of U.S. Patent No. 8,167,141

1. A gravity-fed water filter, comprising:

filter media including at least activated carbon and a lead scavenger;

wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where:

V=volume of the filter media (cm^3),

f=average filtration unit time over lifetime L (min/liter),

c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (μg/liter) soluble lead and 30-60 ppb (μg/liter) colloidal lead greater than 0.1 μm in diameter, and

L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).

CERTIFICATE OF INTEREST

Counsel for Brita LP. certify under Federal Circuit Rule 47.4 that the following information is accurate and complete to the best of their knowledge:

1. **Represented Entities.** Provide the full names of all entities represented by undersigned counsel in this case.

Brita LP

2. **Real Parties in Interest.** Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities.

None.

3. **Parent Corporations and Stockholders.** Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities.

The Clorox Company

4. **Legal Representatives.** List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court.

STERNE KESLER GOLDSTEIN & FOX PLLC: Uma Everett, Josephine Kim, Kyle E. Conklin, Deborah Sterling, Lauren Watt, Robert Niemeier, Davin Guinn, Robert Stout, Christopher Gallo, John Christopher Rozendaal, Byron Pickard, Kristina Kelley, Kathleen E. Willis

5. **Related Cases.** Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)? If yes, concurrently file a separate Notice of Related Case Information that complies with Fed. Cir. R. 47.5(b).

Yes, see separately filed notice.

6. **Organizational Victims and Bankruptcy Cases.** Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees).

Not applicable.

Dated: March 15, 2024

/s/ Deanne E. Maynard
Deanne E. Maynard

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NOTE: Only the addendum to the brief includes confidential information. Green highlighting in the confidential addendum indicates confidentiality. The markings of any other color are part of the original document as filed and not an indicator of confidentiality.

<u>CONFIDENTIAL MATERIAL OMITTED</u>

The non-confidential version of the addendum redacts material at Appx92, Appx107, Appx114-116, Appx121, Appx144, Appx148, Appx175-176, Appx178, Appx182, Appx185-186, Appx202, Appx204, Appx232-235, Appx351-362, Appx366-368, and Appx370 that relates to confidential business information about product development, manufacturing, design, sales, and licensing. That material was filed under seal at the Commission under a protective order.

TABLE OF AUTHORITIES

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Cases

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STATEMENT OF RELATED CASES

No appeal from this International Trade Commission ("Commission") proceeding between Brita LP and respondents—Zero Technologies, LLC and Culligan International Co. ("ZeroWater"); Vestergaard Frandsen Inc. d/b/a LifeStraw; and Kaz USA, Inc. and Helen of Troy Limited ("PUR")—involving U.S. Patent No. 8,167,141 ("'141 patent") has previously been before this Court or any other court. Brita has asserted the '141 patent in *Brita LP v. Zero Technologies LLC*, No. 1:21-cv-01801 (D. Del.) and *Brita LP v. KAZ USA, Inc.*, No. 6:21-cv-01354 (W.D. Tex.). In addition, antitrust claims related to Brita's assertion of the '141 patent are before the district court in *Zero Technologies, LLC v. The Clorox Co.*, No. 2:22-cv-03989 (E.D. Pa.). Counsel for Brita know of no other cases pending in this or any other court that will directly affect or be affected by this Court's decision here.

JURISDICTIONAL STATEMENT

This Court has jurisdiction under 19 U.S.C. § 1337(c) and 28 U.S.C. § 1295(a)(6) from Brita's timely appeal and petition for review of the Commission's September 19, 2023 final determination.

INTRODUCTION

This appeal involves Brita's patent on a breakthrough in water-filtration systems that use gravity, rather than water pressure, to push water through the system. Before Brita's invention, the water-filter field was already advanced. Skilled artisans understood the effects of individual design choices, such as which materials to use in a filter to remove lead and how different filter formats, their layout, size, and shape could affect how long it took water to pass through the filter. But heightened industry standards for lead reduction posed challenges. The prior art lacked a total filter design that achieved good lead reduction while filtering water relatively quickly and over acceptable periods of time. Brita's researchers found a solution—and even developed a formula that teaches which filter properties to select and how to configure them to achieve the previously unattainable. The results spoke for themselves: the inventors' testing showed prototype filters that were far superior to existing ones.

Nevertheless, and largely by misreading intrinsic evidence, the Commission invalidated Brita's patent, overturning a nearly 300-page final Initial Determination by an administrative law judge. The ALJ, who had observed over six days of evidentiary hearings, found that respondents infringe and rejected their everything-but-the-kitchen-sink invalidity theories. The ALJ found the testimony of respondents' invalidity expert "conclusory," "often self-contradictory," and "not

credible." Appx259-261, Appx266, Appx289-290, Appx309-310. She further found that the expert "conceded he had not followed black letter law." Appx259-261, Appx266, Appx289-290, Appx309-310. Given those findings, and the clear intrinsic and extrinsic evidence, the ALJ found that respondents came nowhere close to carrying their clear-and-convincing burden of proof on any of their invalidity theories.

Without disagreeing with the ALJ's credibility determinations, the Commission reversed on enablement, written description, and indefiniteness. The Commission twisted unambiguous claim text and specification passages to mean things they plainly do not. For example, the Commission misread specification passages that disparaged the prior art and distinguished it from the claimed invention as somehow being "admissions" that the inventors had not invented or disclosed how to make and use what they claimed. It similarly misread objective claim text as being subjective and a basis for indefiniteness. In reaching these conclusions, the Commission misinterpreted, or failed to apply, settled law—and wrongly shifted onto Brita the burden of proving its claims valid.

The result is an unwarranted free pass for respondents to continue infringing, which they no longer meaningfully contest they do. The Court should reverse the Commission's invalidity determinations, which are unsupported by law or fact.

STATEMENT OF THE ISSUES

Whether the Commission erred in excusing respondents' infringement by, among other things, misinterpreting plain intrinsic evidence and settled law to hold the claims invalid for nonenablement, inadequate description, and indefiniteness.

STATEMENT OF THE CASE

A. The State Of The Art And Nature Of Brita's Invention

1. The art of gravity-fed water filters was highly developed

This is a case about high-performance water filters, such as the small blue filter pictured to the right of the Brita water pitcher below:

Appx30017. These common household filters are known in the industry as gravity-fed water filters to distinguish them from filters used in pressurized-water filtration systems. Appx407-409(col.1:22-col.5:21). In the main, the mechanics of gravity-fed water systems are simple and predictable—the filter can be loaded into a pitcher

like that shown above, water is added to a reservoir above the filter, and the filter removes contaminants as gravity pushes the water through the filter and into the pitcher. Appx407-409(col.1:22-col.5:21).

Before the invention here, the art of filter design was already advanced. Gravity-fed water filters typically used activated carbon, a porous material prized for its adsorptive properties and also commonly used in other fluid filtration, like air filters. Appx407(col.1:31-39); Appx23461-23466. Sources of activated carbon had been well documented, including "bituminous coal or other forms of coal, or from pitch, bones, nut shells, coconut shells, corn husks, polyacrylonitrile (PAN) polymers, charred cellulosic fibers or materials, wood, and the like." Appx413(col.13:36-40). Depending on which contaminants the filter was designed to remove, the activated carbon could be paired with other additives. Appx408(col.3:25-41). For instance, to remove lead, a dangerous neurotoxin, it was well known to add a lead scavenger, such as "zirconia oxide," "hydroxide," "metal ion exchange zeolite sorbents," or ion exchange resins. Appx414(col.15:39-47). Such scavengers were available for commercial off-the-shelf purchase. Appx408(col.4:51-56), Appx414(col.15:39-47).

It was also well known that these additives could be employed with a variety of filter-media types because the "activated carbon and lead scavengers don't know or care what filter format they're in. They perform their function independent of

how they're organized and what their geometry is." Appx23513-23514 (unrebutted testimony from Brita's expert, Dr. Freeman). The range of filter-media types for housing the chosen additives was broadly studied and documented. These included "carbon block" filters, "mixed-media filters, membrane filters, nonwoven filters, depth media filters, nanoparticle filters, nanofiber filters, and ligands filters." Appx23439; Appx419(col.25:9-12,col.26:34-37) ('141 patent identifying same).

For example, a carbon-block filter is formed by compressing activated carbon with a binder, and potentially other additives, into molds to form hollow blocks. Appx407(col.1:65-col.2:8). The prior art taught how "[p]article size, wall thickness, surface area, and compression can all be adjusted separately to achieve a desired pressure drop through a filter." Appx407(col.2:40-52). Adjusting the pressure drop would in turn tune the filter's effectiveness and the rate at which water flows through the filter (the "flow rate"). Appx407(col.1:40-52).

The other filter media types were similarly well known and well understood. Mixed-media filters used granular activated carbon without a binder. Appx408(col.3:24-col.4:67). The otherwise-loose granules could be loaded into a compartment inside a filter housing to act as a carbon bed, which could again include other additives. Appx408(col.3:24-col.4:67). Just as with carbon-block filters, skilled artisans understood how to manipulate design parameters, like granule size and density, filter bed thickness, and the like to achieve desired filter performance

properties. Appx408(col.3:24-col.4:67). For all the various filter media types, the "science" of how to tune a filter to achieve certain properties was "quite old" and well documented. Appx23588.

2. The '141 patent's inventors invented new ways to configure known types of filter media

Against this backdrop, the '141 patent's inventors invented a new way to configure known filter media types. The inventors recognized that gravity-fed water filter design involves trade-offs—users do not like having to wait for water to pass through the filter, so a high flow rate (or short filtering time) is generally desirable. Appx407-408(col.1:47-52, col.4:41-col.5:14). Yet increasing flow rate decreases the amount of time water contacts the filter media, potentially decreasing the filter's ability to remove contaminants. Appx407-408(col.1:47-52, col.4:41-col.5:14). Filter size is also important—a larger filter may have more surface area for removing contaminants but at the cost of being bulkier and taking up more space in users' homes. Appx408-409(col.4:41-col.5:14). Similarly, users dislike having to replace filters frequently, making a longer filter lifetime desirable. Appx408-409(col.4:41-col.5:14). The inventors also recognized that new standards in lead-contaminant removal presented an additional problem given the poor lead performance of then-available filters. Appx22201-22202 (inventor testimony). Raising lead-contaminant-removal performance without sacrificing flow rate or other desired performance characteristics of a filter posed a special challenge. Appx22201-22202.

Facing these challenges, the ’141 patent inventors devised a new, generalized filter design encapsulating all these various tradeoffs. Appx419(col.25:14-26). The inventors captured this generalized design in what they termed “a Filter Rate and Performance (FRAP) factor”:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where V is the filter volume; f is the average time it takes to filter water (in min/liter); c_e is the “effluent lead concentration” at the end of the filter’s lifetime, a measure of how well the filter is removing lead according to a specified measurement; and L is the filter usage lifetime before the filter needs to be replaced. Appx419(col.25:14-34).[1]

As the patent explains, and as already known in the art, each of the elements in this new FRAP factor was a controllable physical property of the filter, such as its volume (controllable by changing the filter’s dimensions and shape), filtering time (controllable by, for example, changing granule size and density), or its lifetime capacity (controllable by, for example, modifying flow distribution). Appx407-409(col.2:40-col.5:21), Appx415(col.17:39-col.18:53). Inventor testimony explained the same, describing how skilled persons would recognize the direct

[1] “[E]ffluent,” in contrast with “influent,” refers to the water exiting a filter; thus “effluent lead concentration” is the lead concentration of water exiting the filter. Appx411-412 (col.10:58-col.11:13).

relation between each element and the "actual physical nature of the filter" design. Appx22158-22162. The inventors achieved a unified design that created a way "to budget the performance" of the filter. Appx22162. The FRAP factor was the distillation of the key physical characteristics of the inventor's filter design. Appx419(col.25:13-col.26:37). The patent explains that the inventors' universal design created filters with FRAP factors "ranging from 0-350, preferably less than about 200" and that filters with such FRAP factors achieved excellent lead reduction without sacrificing other filter performance characteristics, like filtering time. Appx419(col.25:13-col.26:37).

As practical examples of their new design, the inventors built and tested several filters using carbon blocks as the filter media. Appx412-419(col.11:35-col.25:12). For these carbon-block examples, the inventors detailed the granule size distribution, arrangement, and density of activated carbon, the binding material and lead scavenger, the compression and heating used to form the blocks, the block shape and size, and more. Appx412-419(col.11:35-col.25:12).

But the inventors were express that these carbon-block prototypes were just examples of a generalized design: "Several potential filter materials are described below. While the discussion will tend to focus on block filters, it should be understood that the various materials may be used in granular or 'loose media' type filters, according to various embodiments of the present invention."

Appx413(col.13:30-34); Appx415(col.18:22-23) ("other filtration or treatment media may be used"). The inventors thus explained that "[a]ctivated carbon from any source can be used" and identified the well-known sources for activated carbon. Appx413(col.13:36-40). They similarly explained that their design "is independent of the exact embodiment of the filter and thus applicable to mixed-media," "membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." Appx419(col.25:9-13,26:30-37). And they explained that, although the examples specified dimensions for carbon-block filters, "[s]imilar container dimensions may also be used for embodiments of the present invention that are based on granular media." Appx415(col.17:33-35).

The inventors tested their exemplary carbon-block-filter embodiments and compared them against prior-art, commercially available mixed-media filters from Brita and Pur (a respondent here). Appx419-423(col.26:55-col.33:63). The table below shows the results:

TABLE 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	58.6
PA3-8	40	4.4	89	7.5	45.7
PT3-4	40	4.2	89	6.3	38.7
PT3-6	40	4.6	89	13.3	78.5
PT3-4 alternate housing	40	4.6	89	1.3	16.6
PT3-11	40	4.4	89	8.5	51.2
PT3-13	40	4.2	89	9.2	52.7
PT3-51	40	5.7	89	3.8	36.2
PT3-53	40	5.1	89	2.3	24.2
P2-8 lead sorbent free	40	3.4	89	52.8	208.4
P2-6 lead sorbent free	40	2.3	89	87.1	223.1
Cylindrical Block:					
Block 1	40	17.0	151	9.2	357.7
Block 2	40	9.9	151	14.6	308.2
Mixed Media:					
Brita Granular	40	5.5	128	42.2	386.7
German Maxtra	40	4.9	145	43.8	402.3
Pur 2 stage w/timer	40	16.0	141	30.2	911.4
Pur 2 stage w/timer	40	10.4	141	36.6	706.8
Pur 2 stage w/timer	40	11.0	141	38.6	785.9

Appx423(col.33:25-55); *see* Appx425-426 (making corrections to some of the entries). "Based on the results," none of the "commercially available" "mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead." Appx419-420(col.26:55-col.27:2). That is (as shown in the c_e table column), at the end of the manufacturer-stated filter usage lifetime, the prior-art filters had measured lead concentrations of water exiting the filter far above the lead concentrations for filters embodying the invention, leading to proportionately higher FRAP factors in excess of 350.

Consistent with this description of the invention, the inventors included a single independent claim, which the Commission treated as representative on the issues here:

> 1. A gravity-fed water filter, comprising:
>
> *filter media* including at least activated carbon and a lead scavenger;
>
> wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:
>
> $$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$
>
> where:
>
> V=volume of the filter media (cm^3),
>
> f=average filtration unit time over lifetime L (min/liter),
>
> c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter, and
>
> *L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)*.

Appx423 (emphasis added).

B. Proceedings Before The ITC

1. After a **Markman** *hearing and a six-day evidentiary hearing, the ALJ found respondents' invalidity expert not credible and found that respondents infringed and failed to prove invalidity*

Brita is a leader in the consumer water-filter market because of its ability to meet consumer demand for compact filters that work quickly, remove contaminants, and produce great tasting water. Appx490. Concerned about the high volume of imported filters using the '141 patent's inventive design, Brita brought this Commission action seeking a limited exclusion order and cease-and-desist orders. Appx543-544. After a *Markman* hearing and a six-day evidentiary hearing, the administrative law judge found that respondents infringed claims 1-6 and 23 and that they failed to prove any of their invalidity defenses.

Enablement: The ALJ rejected respondents' enablement challenge. Making detailed findings on each *Wands* factor, the ALJ again found respondents' expert Dr. Hatch "conclusory" testimony without "substantiation" that "was not accurate or complete, as cross-examination exposed." Appx282-327 (citing *In re Wands*, 858 F.2d 731 (Fed. Cir. 1988)). For example, "Dr. Hatch agreed and testified that the state of the art prior to the invention was well-known," including "that the other filters and processes were well-known." Appx309-310. Although Dr. Hatch stated that practicing the invention with non-carbon-block filters "requires 'a lot' of experimentation," the ALJ found that he never "explain[ed] what undue

experimentation" would be required and "did not provide explicitly supported evidence with his opinion" about "the quantity of experimentation necessary." Appx289-290. Given these and other findings, the ALJ found respondents failed to carry their clear-and-convincing burden of proof.

Written Description: Respondents also raised scattershot written-description challenges. Appx246-281. The ALJ rejected them all, including respondents' argument that the failure to limit the claimed "filter media" to a carbon-block filter left the claims inadequately described. Pointing both to the original claims and the specification's express enumeration of the other filter-media types, the ALJ found that respondents "lacked credible support for any dispute that explicit disclosures of the claims, or the invention claimed does not exist." Appx252-258.

The ALJ contrasted Brita's expert testimony from Dr. Freeman, who carefully compared the claims to the patent's detailed disclosures, with respondents' expert testimony. Appx259-261. The ALJ found respondents' expert, Dr. Hatch, "contradicted himself a number of times and conceded that he had not followed black letter law," was "not credible," and "undermined his own testimony when he admitted that written description support does exist in the original claims" and "in the specification." Appx259-261, Appx266 ("often self-contradictory"; "legally and factually erroneous"). The ALJ also detailed other evidence, like the substantial "existing knowledge in the field," all experts' agreement that "filtration media

materials in gravity-fed water filters were well-known," and the "numerous writings" showing that "the field could be considered predictable." Appx272-282.

Indefiniteness: The ALJ also rejected respondents' argument that the term "L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)" rendered the claims indefinite. Appx4516-4549. The ALJ concluded that the claim text and the specification both define "filter usage lifetime" in terms of "[t]he total gallons of water" that "can be filtered before the filter is replaced." Appx4529-4530 (citing Appx412, Appx418(col.12:27-28,col.23:26-32)). The plain claim text also specifies which filter usage lifetime to use: the one "claimed by a manufacturer or seller," such as on packaging or marketing material. Appx4529-4532. The ALJ explained that the '141 patent incorporates by reference the NSF/ANSI 53 standard, which provides a "default methodology" for manufacturers and sellers to use in determining what filter usage lifetime to claim. Appx4532.

The ALJ found that "one of ordinary skill in the art" here "would understand the word 'claims' in the context of the [NSF/ANSI 53] standard that limits what can be claimed on packaging." Appx4532. That is, because the incorporated standard and established industry practice required manufacturers to validate any filter usage lifetime they choose to claim, the ordinary meaning of "filter usage lifetime claimed by a manufacturer or seller" is a lifetime the manufacturer or seller has "validated" through testing, such as by using the NSF/ANSI 53 methodology. Appx4532.

Although the ALJ read "filter usage lifetime" as not limited to using the NSF/ANSI 53 methodology for validation and respondents argued that other validation methodologies existed, the ALJ found that they "ha[d] not proved that any differences in calculations are consequential." Appx4532. The ALJ thus construed the claim phrase to mean "[t]he total number of gallons of water that a manufacturer or seller has validated can be filtered before the filter is replaced." Appx4529, Appx4532.

Other invalidity challenges: The ALJ's decision was similarly thorough in rejecting respondents' anticipation and subject-matter eligibility challenges. The ALJ found throughout that respondents relied on flawed expert testimony and unsupported theories. Appx194-346.

Having found that Brita established a violation under Section 337, the ALJ recommended entry of a limited exclusion order against respondents and cease-and-desist orders against PUR and LifeStraw. Appx362-372.

2. Without contradicting the ALJ's credibility findings and assessment of the experts, the Commission held the claims invalid

Before the Commission, respondents no longer meaningfully contested infringement. Appx3. The Commission nevertheless granted in part respondents' petition to review the ALJ's invalidity determinations, ultimately holding the claims invalid on three grounds—nonenablement, inadequate description, and

indefiniteness. Appx3. The Commission left undisturbed the ALJ's findings rejecting respondents' written-description and enablement challenges based on "the ranges of values of the FRAP factor and its variables recited in the asserted claims." Appx29 n.16. Focusing instead on respondents' challenges based on the range of filter media types within the claims' scope, the Commission expressly recognized that the ALJ's "findings are based in part on its credibility determinations." Appx30, Appx38, Appx42-43, Appx48. Without disagreeing with those determinations, the Commission held the ALJ's findings "cannot overcome the express disclosures in the patent" and inventor testimony that the Commission thought supported invalidity. Appx38.

Enablement: The Commission held the claims invalid for lack of enablement based largely on its reading of the intrinsic evidence. Appx38-58. The Commission focused on the specification's testing comparing embodiments of the claimed invention to prior-art mixed-media filters. Appx32-38 (citing Appx419-420(col.26:55-col.27:2)). It thought that testing showed "the failed efforts of the inventors to create a non-carbon block filter." Appx50. And despite an admittedly highly developed field, the Commission thought the facts here were analogous to those in decisions involving new technology. Appx56-57.

Written Description: The Commission reversed the ALJ's determination on written description based on the same intrinsic evidence describing the deficiencies

of prior-art filters, which the Commission read as an "admission in the patent" that "the inventors were only in possession of a filter that uses carbon blocks." Appx32-38. The Commission also pointed to inventor testimony in which the inventors stated they had not produced prototypes using other filter media types. Appx35-37.

Indefiniteness: The Commission held that the term "filter usage lifetime *claimed by* a manufacturer or seller of the filter (gallons)" was "subjective language" that left the claims without reasonably certain scope. Appx16-27 (Commission's emphasis; "pure subjectivity"). The Commission acknowledged that the patent "specifically defines" the term, but it faulted "Brita's evidentiary basis" and "Brita's arguments and evidence" for "fail[ing] to cabin the lifetime" in "a manner that can be understood" with reasonable certainty. Appx23-27. Commissioner Stayin dissented because the ALJ correctly construed the claims as objective, neither respondents nor the majority identified any "concrete examples" of variability in claim scope, and the majority "appears to invert the burden of proof by faulting" Brita for not proving its claims valid. Appx16 n.11.

Having held the asserted claims invalid on these grounds, the Commission took no position on the ALJ's findings of no anticipation and no subject-matter ineligibility. Appx3. Nor did it reach the issue of remedy, including Brita's challenge to the ALJ's proposal not to grant a cease-and-desist order against ZeroWater. Appx3; Appx7036-7037.

SUMMARY OF ARGUMENT

The Commission's errors in interpreting plain intrinsic evidence and precedent require reversal of all three of its invalidity determinations.

I. On enablement, the Commission never disagreed with the ALJ's assessment of the expert testimony. Yet that testimony and the intrinsic evidence are dispositive. Both experts agreed the art here was highly developed. Both agreed the types of filter media were well known. And both agreed skilled artisans understood how to modify different filter-media types to achieve specific objectives. That evidence and the patent's clear teachings about how different design choices affect filter performance affirmatively proved *enablement*, even though respondents' had the burden to prove *non*enablement by clear-and-convincing evidence.

The Commission held otherwise mostly because it thought the specification contained admissions that the invention did not work with non-carbon-block filters. That was wrong—the passages on which the Commission focused describe the shortcoming of *prior-art* filters, not filters applying the patent's teachings. The Commission also cited inventor testimony that merely acknowledges the inventors did not produce prototypes for all filter-media types. Because enablement does not require actual reduction to practice of every embodiment within the claims' scope, the Commission's decision cannot stand.

II. The Commission's written-description determination falls with enablement—the Commission itself expressly linked them. Yet even without that, the adequacy of the description is beyond reasonable dispute. The original claims were express that the inventors had an invention that applied to all filter-media types, not just carbon-block filters. The patent definitively states the same, identifying by name the commonly known types of filter media and explaining that the patent's teachings apply to each. Precedent upon precedent compels upholding Brita's claims given those clear descriptions.

None of the Commission's reasons for holding otherwise is legally or factually supportable. The Commission confused written description with enablement, wrongly demanding teachings about "how to" practice the invention. It also again misread the same specification passages about the prior art as admissions about the invention. And it relied on decisions involving wholly different facts, like pharmaceutical-compound claims covering potentially billions of compounds.

III. The intrinsic evidence is similarly plain and compelling on claim definiteness. All parties agreed that the disputed "filter usage lifetime" phrase has a plain meaning, consistent with widespread industry practice in this consumer-focused field: it refers to the number of gallons for which a filter can be used before replacement. As the surrounding claim text makes clear, the lifetime is one that must be verified by the manufacturer or seller so that consumers are accurately and clearly

informed. The specification gives the same express definition, even incorporating by reference industry standards that provide further clarity about the claims' scope.

The Commission nevertheless injected nonexistent ambiguity into the claims. It read "filter usage lifetime" as somehow subjective. Yet nothing in the claim language here is like the subjective terms "aesthetically pleasing" or "unobtrusive" in the decisions cited by the Commission. And the Commission's repeated attempts to dismiss undisputed industry practice have no merit. There is no requirement that industry practice be mandatory to be relevant; nor does it matter whether industry practice may change over time, especially when there is no evidence that any changes could materially alter the claims' scope.

STANDARD OF REVIEW

The Court reviews the Commission's legal determinations de novo and its factual determinations for substantial evidence. *Ajinomoto Co. v. ITC*, 932 F.3d 1342, 1352 (Fed. Cir. 2019). "Whether a claim satisfies the enablement requirement" is "a question of law" that this Court "review[s] without deference." *Alcon Rsch. Ltd. v. Barr Lab'ys., Inc.*, 745 F.3d 1180, 1188 (Fed. Cir. 2014). Any underlying factual findings are reviewed for substantial evidence, but only insofar as the enablement determination is based on them. *Id.*; *Ajinomoto*, 932 F.3d at 1352.

"Whether a claim satisfies the written description requirement is a question of fact," but the "interpretation of precedent regarding the written description

requirement is reviewed without deference." *Alcon*, 745 F.3d at 1190. Likewise, this Court gives no deference when reviewing the interpretation of "the plain text of the specification" for written description. *Novartis Pharms. Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1018 (Fed. Cir. 2022).

The Court reviews indefiniteness under the same standards as claim construction, applying *de novo* review to the ultimate indefiniteness determination and the interpretation of intrinsic patent evidence. *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365 (Fed. Cir. 2017).

ARGUMENT

I. THE COMMISSION ERRED IN HOLDING THE CLAIMS NON-ENABLED BASED ON A MISREADING OF PLAIN INTRINSIC EVIDENCE AND INAPPOSITE INVENTOR TESTIMONY

A. Intrinsic Evidence, Admissions From Respondents' Expert, And Unrebutted Extrinsic Evidence Compel Reversal

Patent challengers bear a heavy burden to prove a patent fails to describe "the manner and process of making and using" the claimed invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains" to "make and use the same." 35 U.S.C. § 112. To meet that burden, "a challenger must show by clear and convincing evidence that a person of ordinary skill in the art would not be able to practice the claimed invention without 'undue experimentation.'" *Alcon*, 745 F.3d at 1188 (quoting *Wands*, 858 F.2d at 736-37). That is, showing a need for some experimentation is not enough; claims are enabled

if "experimentation is either 'undue' or sufficiently routine such that an ordinarily skilled artisan would reasonably be expected to carry it out." *Id.* In the end, Section 112 merely requires "reasonable enablement of the scope" of the claimed matter, which can exist without "'describ[ing] how to make and use every possible variant of the claimed invention.'" *McRO, Inc. v. Bandai Namco Games Am., Inc.*, 959 F.3d 1091, 1100 (Fed. Cir. 2020) (citation omitted).

Whether skilled artisans would require undue experimentation to practice the full scope of claims "is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Cephalon, Inc. v. Watson Pharms., Inc.*, 707 F.3d 1330, 1336 (Fed. Cir. 2013) (citation omitted). This Court has long recognized the *Wands* factors as potentially relevant to the inquiry, including "the quantity of experimentation," "the amount of direction" given, the presence of "working examples," "the nature of the invention" and "breadth of the claims," "the state of the prior art" and "relative skill" in the art, and "the predictability" of the art. *Wands*, 858 F.3d at 737.

Here, these factors overwhelmingly disprove any assertion of nonenablement. That was the ALJ's well-supported conclusion based on plain intrinsic evidence, unrebutted testimony from Brita's expert Dr. Freeman, concessions by respondents' expert Dr. Hatch, and credibility determinations undisturbed by the Commission. Appx282-327. Dr. Freeman explained how the examples in the '141 patent disclose

to skilled artisans "the filter volume," the "lead scavenger component," the "activated carbon component," and "how closely compressed the activated carbon and lead scavenger" were. Appx290 (citing Appx23521). Dr. Freeman explained that this guidance would apply to non-carbon-block filters because skilled artisans "could use those same starting materials and apply them to a different geometry" to get "comparable performance"; "the raw materials that go into the filter are going to perform their function in any filter media that they're put into." Appx23521-23522; Appx290 (crediting same); *see* Appx23524, Appx23636-23637 (similar); Appx292.

The ALJ also found that "gravity-fed water filters and various filter media types were well-known, studied and written about extensively in the art before 2007 to the point of being applicable to different filter media types" in a "predictable" fashion. Appx277-278, Appx309-311. She found Dr. Freeman's testimony unrebutted that this was "a well-known field" that "is rather predictable" because "there's a lot of information available" about "the components that go into" filters," "how do they perform," and the "theory underpinning them so that they can be modeled." Appx277-278 (emphasis omitted; quoting Appx23525-23526). The ALJ recognized there were literally "handbooks" available on different filter media that practitioners could turn to. Appx309-310 (citing Appx23491, Appx23495-23498; Appx30693-30753; Appx30755, Appx30760-30767; Appx30684-30692; Appx32163-32185).

Far from rebutting these facts, Dr. Hatch confirmed them. He admitted that "gravity-fed filters have been known for a long time," "there were a number of well-known filtration media materials" including those listed in the '141 patent, and the underlying science of "how to use physical barriers to filter out suspended particles" was "well known." Appx23461-23462; Appx309-310 (ALJ also relying on these admissions); *see* Appx23464-23466 (similar). Dr. Hatch went even further in admitting this was a highly developed field in which skilled artisans were able to apply the patent's teachings to a variety of filter-media types. He conceded "it was well known at the time that configuration of a gravity-fed water filter cartridge could be modified in order to achieve certain desired benefits." Appx23467-2346878. That included "configur[ing] the shape and size" and "volume." Appx23467-23468. It included "configur[ing] the composition of filtration media." Appx23467-23468. And it included modifying a filter "to achieve fast flow rates." Appx23467-23468. These admissions lined up with Dr. Freeman's testimony, which the ALJ credited as showing "certain well-known principles or relationships" that skilled artisans would understand as "'govern[ing]'" filter design regardless of filter-media type. Appx311-312 (quoting Appx23588-23589).

An "'artisan's knowledge of the prior art and routine experimentation can often fill gaps, interpolate between embodiments, and perhaps even extrapolate beyond the disclosed embodiments depending upon the predictability of the art.'"

McRO, 959 F.3d at 1102 (citation omitted). Such is the case here, given the undisputedly advanced state of the art, its predictability, and the patent's clear, detailed teachings and exemplary embodiments.

B. The Commission Misinterpreted Clear Intrinsic Evidence And Departed From Settled Law

1. The Commission erred in reading the specification's description of the prior art's shortcomings as an admission of failure by the inventors

The Commission based its contrary conclusion on a flawed reading of the '141 patent's specification. It recognized that the ALJ's decision followed from the expert testimony. Appx48 (ALJ decision "largely relied on experts"). Without disagreeing with the ALJ's assessment of the experts, the Commission treated as dispositive what it read as an admission of failure in practicing the invention with mixed-media filters. Appx48-58 (citing Appx419(col.26:63-67)). But "the ALJ's 'decision is part of the record,'" and an "agency's departures from the ALJ's findings are vulnerable if they fail to reflect attentive consideration to the ALJ's decision." *Morall v. DEA*, 412 F.3d 165, 176-77 (D.C. Cir. 2005) (citation omitted).

Here, the Commission's decision is more than vulnerable—it is wrong. The specification contains no admission of failure, and the Commission had no basis for departing from the ALJ's well-supported conclusions. The full passage on which the Commission focused reads:

> Several gravity fed carbon blocks and mixed media filters have been tested for flow rate and lead reduction capability against the defined lead challenge water. Filters tested include several formulations of carbon blocks along with commercially available mixed media filters produced by BRITA® and PUR®. Based on the results from testing, the FRAP factors were calculated for each filter and reported below. No mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead. The formulations of gravity fed carbon blocks disclosed are unique in the[ir] ability to meet the required FRAP factor. The "Examples" below include many examples of gravity flow carbon blocks that have a FRAP factor of less than 350. It is not believed that any currently-marketed gravity-flow filters have a FRAP factor of less than 350.

Appx419-420(col.26:55-col.27:2). The Commission repeatedly cited this passage as showing the inventors' "failed efforts" and "unsuccessful" attempts in applying the patent's teachings to mixed-media filters and as an admission that only carbon-block filters would "unique[ly]" work. Appx48, Appx50, Appx51, Appx53, Appx55, Appx56-57.

Yet the passage plainly states that the non-carbon-block filters the inventors tested were all prior-art filters: "*commercially available* mixed media filters produced by BRITA® and PUR®." Appx419(col.26:55-col.27:2; emphasis added),

Appx422(col.31:9-18) (mixed-media "filters tested were *the current* BRITA®" and "PUR®" filters; emphasis added). The passage simply asserts that the invention was novel: the "disclosed" exemplary embodiments of the invention were "unique" in achieving the required FRAP performance factor as compared to the "commercially available" tested filters and other "currently-marketed" filters. Appx419-420(col.26:55-col.27:2), Appx422(col.31:9-60); Appx23518 (unrebutted testimony from Dr. Freeman explaining same). That other skilled artisans failed to achieve the invention *without* the patent's teachings says nothing about what those artisans could achieve *with* the invention's teachings, which is the proper inquiry for enablement. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1355 (Fed. Cir. 2012) (question is what skilled artisan could do armed with "the specification").

2. The Commission erred in relying on inventor testimony merely acknowledging the inventors produced only carbon-block prototypes

The Commission's reliance on inventor testimony was similarly misplaced and erroneous. The Commission asserted that "the inventors readily admit that they did not invent any filter with a material type other than carbon block." Appx49 (citing Appx22202-22204); *see* Appx51, Appx53-54, Appx55 (repeatedly relying on similar testimony), Appx36 (relying on same and similar testimony for written description). But just as with the specification, the inventor testimony contradicts

the Commission. The inventors merely agreed that they "didn't develop any prototypes":

> Q. And it is true that, with respect to the work with relation to the '141 patent, that Brita did not invent anything new or unique as far as granular or paper media?
>
> A. We did not develop any prototypes with the granular media, correct.
>
> Q. Specifically Brita did not invent any granular activated carbon and ion exchange resin combination that met the '141 patent's claimed FRAP limitation; isn't that right?
>
> A. Yes, we didn't develop any prototypes.

Appx22202-22204 (repeatedly giving similar answers for other filter media types); *see* Appx32720, Appx32983; Appx32227; Appx32299-32301 (all similar). The same inventor similarly explained she could "imagine" someone "develop[ing] new technology" because she herself had not created other filter types. Appx32983-3296; Appx50-51, Appx55.

The Commission erred in concluding this testimony showed non-enablement or unpredictability. It acknowledged the testimony meant only that the inventors created no non-carbon-block prototypes but thought that "proves the point" by showing "the inventors indisputably had not attained any other filter material." Appx50-51. The Commission then drew a straight line from the lack of working examples for non-carbon-block filters to supposed undue experimentation: "Indeed, the only functional embodiment disclosed is carbon blocks. Thus, developing non-

carbon block filters to achieve the claimed FRAP would require 'painstaking' or at least undue, experimentation to uncover the new technology." Appx56-57 (quoting *Amgen Inc. v. Sanofi*, 143 S. Ct. 1243, 1256 (2023)); *see* Appx48-58 (repeatedly treating as fatal lack of non-carbon-block examples).

But "[i]t is well settled that an invention may be patented before it is actually reduced to practice." *Alcon*, 745 F.3d at 1189-90. A patentee need not build *any* "actual working examples," nor must inventors "set forth, or even know, how or why the invention works." *Id.* (citation omitted). Patent challengers thus must do more than point to the absence of prototypes and the like—they must "show by clear and convincing evidence" that the disclosed examples, working or "prophetic," "together with other parts of the specification are not enabling." *Id.* (citation omitted). Here, the inventors actually reduced the invention to practice with multiple working examples of carbon-block filters. Appx420-423(col.27:13-col.34:3). Extensive evidence showed that those examples were more than enough to allow artisans to practice the claims' full scope given the wealth of information and experience in the art. Appx277-278, Appx309-311; *supra* Part I.A. The Commission was wrong to demand more. *Alcon*, 745 F.3d at 1189-90; *Bayer Healthcare LLC v. Baxalta Inc.*, 989 F.3d 964, 988 (Fed. Cir. 2021) (rejecting similar reasoning).

3. The Commission erred in failing to confront the admissions on undisputed evidence of a highly developed, predictable art

The Commission compounded these errors by failing to grapple with the admissions and unrebutted evidence. As explained, that evidence shows skilled artisans already had comprehensive knowledge that would allow them to apply the examples involving carbon-block filters to other filter-media types. *Supra* Part I.A. The Commission seemed to ignore the evidence altogether, stating in conclusory fashion and without any support that "there is no evidence that th[e] alleged advanced state of the prior art shows that a skilled artisan could have used other filter media to achieve the claimed invention without undue experimentation." Appx52-53. But as the ALJ found, that is exactly what the evidence shows, including respondents' expert Dr. Hatch's admissions. Appx277-278, Appx309-311; Appx23461-23471.

The Commission's conclusory reasoning is like the reasoning this Court rejected in overturning the invalidity determination in *Cephalon*. There, the claims required administering an "effervescent agent in an amount sufficient to increase absorption" of a drug. *Cephalon*, 707 F.3d at 1334-35 (emphasis omitted). The district court held the claims invalid for lack of enablement because they were broad enough to cover administering a single-compound effervescent agent but the patent provided examples of only effervescent "couple[s]" with two compounds. *Id.* at 1336-37.

This Court reversed, rejecting the district court's "emphasis on the mere fact that experimentation may be necessary" to make and use additional embodiments beyond the disclosed examples. *Id.* at 1338-40. The burden was on the challenger to identify not just gaps between disclosed examples and the claims' scope, but also "testimony or documentary evidence" clearly and convincingly establishing that the examples "do not provide sufficient guidance" to avoid the need for "excessive" experimentation. *Id.* "Unsubstantiated statements" that experimentation would be "difficult" or "complicated" were not enough. *Id.* Nor was inventor testimony admitting the inventors did not themselves possess single-compound agents. *Id.*

The absence of clear-and-convincing evidence substantiating any need for undue experimentation similarly requires upholding Brita's claims, as the ALJ correctly recognized. Appx289-293, Appx327. The Commission speculated that the claims were not enabled because "the FRAP factor does not embody a well-known or predictable law of physics" and the "variables are interrelated such that changing one variable will change other variables." Appx53-55 (citing Appx23437; Appx22218-22219; also complaining "patent fails to disclose a general feature or characteristic"). But "unsubstantiated" and "conclusory" statements that "many 'variables'" "*may* affect" practice of the claims "is not sufficient." *Alcon*, 745 F.3d at 1189 (Court's emphasis). And none of the Commission-cited testimony showed that any interrelation in filter characteristics created unpredictability or would have

led to undue experimentation in practicing the claims. Appx23436-23437 (Dr. Hatch explaining ways in which skilled artisan could predict interrelation); Appx22217-22218 (similar from inventor). To the contrary, both experts agreed that the art involved "well-known science principles" and "relationships." Appx23588-23589; Appx23461-23468. The '141 patent also addresses that interrelation, such as by expressly describing how a filter's "external surface area" can "influence the flow rate" and how it can be important to "maximize the volume" while "decreasing [the] pressure drop." Appx415(col.17:15-61). And as already explained, both experts agreed it was well known how to achieve objectives like that by modifying gravity-fed water filters of various types. *Supra* Part I.A.

Finally, the Commission's reliance on easily distinguishable precedent betrays how far it strayed in invalidating the claims here. Nothing in this case is like *Amgen*, which involved the highly unpredictable biopharmaceutical field with claims to a new class of an untold number of antibodies defined functionally. 143 S. Ct. at 1248-51. This case involves a predictable art, an admittedly well-developed field, and a well-known, and small, class of filters. For the same reason, the facts here are not "reminiscent of *Incandescent Lamp*," in which applicants attempted to claim all yet undeveloped means for making an incandescent lamp, an entirely new technology at the time. Appx57 (citing *The Incandescent Lamp Patent*, 159 U.S. 465 (1895)).

II. THE COMMISSION ERRED IN HOLDING THE CLAIMS INADEQUATELY DESCRIBED BY MISREADING PLAIN INTRINSIC EVIDENCE AND RELYING ON INAPPOSITE INVENTOR TESTIMONY

A. Intrinsic Evidence And Admissions From Respondents' Expert Compel Reversal

In predictable arts like the one here, the requirement that a patent include a "written description of the invention" is not a high bar. 35 U.S.C. § 112. After all, a patent's description is read from the perspective of persons already "skilled in the art" and so need only "convey with reasonable clarity to" them "that, as of the filing date sought," the applicant "was in possession of the invention." *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991) (emphasis omitted). If such a skilled artisan can recognize that "[w]hat is claimed" is "the same as what is disclosed in the specification," the requirement is met. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 736 (2002). In a Commission investigation, the respondents must prove lack of written description by clear-and-convincing evidence. *Ajinomoto*, 932 F.3d at 1352.

Here, three related principles, alone or combined, show respondents failed to carry that heavy burden. In concluding otherwise, the Commission erred legally and factually.

1. The original claims alone or with other intrinsic evidence are adequate

As the ALJ found, the original claims alone, or with other intrinsic evidence, suffice to adequately describe the invention of the '141 patent. Appx251-264.

Original claims are part of the written description under Section 112 "and in many cases will satisfy the written description requirement." *ScriptPro LLC v. Innovation Assoc.*, 833 F.3d 1336, 1341 (Fed. Cir. 2016) (citation omitted). The patent in *ScriptPro* recited an automated collating and storing unit for prescription medication containers. *Id.* at 1338-39. The patent's written description primarily focused on "embodiments employing a sorting and storage scheme based on patient-identifying information." *Id.* at 1341. But the claims were not so limited, which the district court thought left them inadequately described and invalid. *Id.* at 1339-40. This Court reversed—seeing "no triable issue of fact"—in large part because "the original claims" were "not limited to sorting and storing prescription containers by patient-identifying information." *Id.* at 1341-42, n.3. The Court held that "a specification's focus on one particular embodiment or purpose cannot limit the described invention where that specification expressly contemplates other embodiments." *Id*. That is "especially true" "where the originally filed claims are not limited to the embodiment" that "is the focus of the specification." *Id.*

The materially similar facts here require the same result. As in *ScriptPro*, the original claims directly answer the Commission's question whether the applicants

possessed an invention limited to filters "us[ing] carbon blocks" or encompassed "other types of filter media." Appx34. Original claim 1, just like issued claim 1, defines an invention encompassing any "filter media including at least activated carbon and a lead scavenger." Appx31364; Appx423 (col.34:7-26). And original claims 20 and 21, like issued claims 20 and 21, specifically identify an invention using non-carbon-block media, including "filter media compris[ing] primarily particles that are not bound together" or media "in the form of granular carbon." Appx31366; Appx424 (col.35:8-12). Like the original claims in *ScriptPro*, the original claims here show the applicants expressly appreciated that their invention applied to a variety of filter-media types, not just carbon-block filters. *See* Appx251-254 (ALJ noting same).

Also as in *ScriptPro*, other parts of the written description show the applicants here expressly contemplated a broader invention than the Commission's narrow focus on carbon-block embodiments. 833 F.3d at 1341-42. The written description describes applying the invention to other media types: "The nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed-media, carbon blocks, non-wovens, hollow fibers and other filtration formats." Appx419(col.25:9-12). It similarly states that the filter "criteria set forth herein is applicable to all embodiments of pour through filters including but not limited to mixed media (carbon and ion exchange resin),

carbon blocks," "membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." Appx419(col.26:30-37); *see* Appx420(col.27:26-27) ("As noted above, various sizes and types of media may be used."). Like the original claims, these descriptions leave no doubt the applicants possessed an invention "independent of" the exact filter-media type used and provide adequate support for claims to such an invention. *See* Appx254-264 (ALJ finding same).

2. The '141 patent's express and definite identification of an invention "applicable to all embodiments" of well-known filter media types also provides sufficient description

The written description here is also adequate because it includes a constructive reduction to practice that identifies the invention in a definite way. A "broad" and "clear" principle of written-description law is "that the written description requirement does not demand either examples or an actual reduction to practice; a constructive reduction to practice that in a definite way identifies the claimed invention can satisfy the written description requirement." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc) (citing *Falko-Gunter Falkner v. Inglis*, 448 F.3d 1357, 1366-67 (Fed. Cir. 2006)).

Falko-Gunter illustrates this principle. The invention there was "a way of making vaccines safer" and more "readily grown" by deleting an essential gene. *Falko-Gunter*, 448 F.3d at 1360. The application "focused on herpesvirus" specifically. *Id.* at 1361-62. But it noted that the "'invention can be applied to *any*

virus'" with certain known features. *Id.* at 1364-1365 (emphasis in *Falko-Gunter*). It identified "vaccinia virus, a poxvirus," as one virus to which the invention could be applied, although it acknowledged "[n]o vaccinia virus with a deletion in an essential gene has yet been produced." *Id.* (quoting application). This Court held that description sufficed to show possession of an invention directed to poxvirus/vaccinia virus. Although the description only briefly discussed applying its teachings to poxvirus, "[n]o length requirement exists." *Id.* And unrefuted expert testimony showed that "essential genes for poxvirus were well-known," confirming that skilled artisans reading the brief description would understand the inventors possessed an invention that could be applied to poxvirus. *Id.*

The written description here is similarly adequate because it definitively identifies the invention, including that the invention is independent of the filter-media type (beyond requiring the media to "includ[e] at least activated carbon and a lead scavenger"). Appx423(col.34:7-26). The written description definitively states that the invention is "applicable to all embodiments of pour through filters" including "mixed media," "carbon blocks," "membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." Appx419(col.25:9-12, col.26:30-37), Appx420(col.27:26-27).

And as in *Falko-Gunter*, it is uncontested that these other filter-media types were well known before the filing date here. 448 F.3d at 1360. Respondents' expert

Dr. Hatch admitted "there were a number of well-known filtration media materials," that "activated carbon" was "one of the primary ingredients" used with such media, and that the well-known filter media types included mixed media using "loose granular" activated carbon, "nonwoven[s]," "depth media," "nanofiber[s]," and "ligands." Appx23439-23440, Appx23461-23466. Just as in *Falko-Gutner*, the written description's definite disclosure of an invention applicable to these other well-known filter-media types conveys to ordinarily skilled artisan's that the inventors possessed the claimed invention.

3. *The description's detailed embodiments are representative, especially given admissions that the genus of filter media types was already well known*

The written description here is also adequate because it discloses representative examples and common structural features supporting possession of the entire claimed matter. A claim "encompassing two or more disclosed embodiments within its scope" is often called a "genus" claim. *Billups-Rothenberg Inc. v. ARUP*, 642 F.3d 1031, 1037 (Fed. Cir. 2011). Genus claims may be adequately described by disclosing "'a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can "visualize or recognize" the members of the genus.'" *Ajinomoto*, 932 F.3d at 1358-59 (quoting *Ariad*, 598 F.3d at 1350)).

But what is needed to adequately describe such claims varies by context. The description required for claims directed to combinations involving a genus "already well explored in the relevant art by the time of" patenting is thus different from that required for claims to a new genus. *Ajinomoto*, 932 F.3d at 1359. For claims to a novel combination of a known genus—especially "[i]n cases involving predictable factors, such as mechanical or electrical elements"—"a single embodiment" can be representative because "once imagined, other embodiments" will be apparent to persons of ordinary skill. *In re Fisher*, 427 F.2d 833, 839 (CCPA 1970); *Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1361 (Fed. Cir. 2018) ("lower level of detail" may suffice in "predictable art").

Here, the claimed invention is a novel way of arranging known filter-media types, not a new genus of filter-media types. Appx423(col.34:7-26). As already shown, there is no dispute that the genus of filter-media types was already well known before the '141 patent's filing. Appx23461-23466; *supra* pp. 37-38. Plus, respondent's expert Dr. Hatch admitted that adapting these known filter-media types to achieve specific goals was also well known: "it was well known at the time that configuration of a gravity-fed water filter cartridge could be modified in order to achieve certain desired benefits." Appx23466-23469 (parenthetical omitted). In this context, the patent's detailed description of embodiments using carbon-block filters sufficed to show possession of an invention applicable to other well-known filter

media types. Appx23461-23469. As the ALJ found, and the Commission never disturbed, Brita's expert Dr. Freeman "offered his uncontradicted, credible opinion and specific fact-based testimony that known filtration concepts at the time of the '141 invention were applicable across filter media types": "'there was so much information available, not only in the patent, but also in the art in this really well-studied field that would allow a person of skill in the art to take the teachings on carbon blocks in the '141 patent and apply those to other filter media.'" Appx276-278 (quoting Appx23513-23514 and noting "unrebutted"). Given that undisputed knowledge, a skilled reader of the '141 patent would understand from the patent's detailed examples with carbon-block filters that the inventors also possessed an invention applicable to other filter-media types.

B. The Commission Departed From Settled Law And Misinterpreted Clear Intrinsic Evidence

The Commission's contrary conclusion was premised on legal error and unsupported factual findings (to the extent it made any). Its primary rationale was that the patent's statements identifying other filter-media types "provide no guidance on *how* to achieve the claimed FRAP using filter media other than carbon blocks." Appx34-35, Appx37 ("specification does not describe *how* that combination can be used to achieve the required FRAP factor with a filter media other than carbon block"; "disclosure does not describe *how* any other types of filter media can achieve the claimed FRAP factor" (emphasis added; parenthetical omitted)). But as already

shown, the ’141 patent does teach how to achieve the claimed invention using other filter media types. *Supra* Part I. And regardless, “written description is about whether the skilled reader of the patent disclosure can recognize that what was claimed corresponds to what was described; it is not about whether the patentee has proven to the skilled reader that the invention works, or how to make it work, which is an enablement issue.” *Alcon*, 745 F.3d at 1191. The Commission legally erred in applying a “how to” requirement for written description.

The Commission also reasoned that the patent’s use “of the term ‘etc.’ indicates a genus broader than that which is specifically enumerated.” Appx37. But the Commission identified no unenumerated filter media that could be used to practice the claims. Appx37. This Court has rejected similar “conclusory” and “abstract assertion[s] of breadth, without concrete identification of matter that is not” described “but is or may be within the claim scope.” *McRo*, 959 F.3d at 1101. Given the admissions about the well-known class of filter-media types for use in gravity-fed water filters, the Commission’s similarly conclusory rationale fails.

The Commission also again misread, or at least misunderstood the import of, plain specification disclosures. As with its enablement analysis, the Commission repeatedly treated the patent’s statements about the testing of prior-art filters as an “admission in the patent” that the inventors did not possess an invention applicable to non-carbon-block filter media. Appx34 (citing Appx419-420(col.26:55-

col.27:2)). But for all the reasons explained, there was no such admission. *Supra* pp. 25-27. And as *Falko-Gutner*, claims are not invalid for inadequate description merely because an alternative embodiment of the invention "had not yet been produced." 448 F.3d at 1360; *Ariad*, 598 F.3d at 1352. All that is required is a constructive reduction to practice, which the '141 patent provides in the original claims, in express statements recognizing that the invention is independent of the filter-media type, and with clear examples showing to skilled artisans the required possession. *Ariad*, 598 F.3d at 1352.

The Commission's reliance on inventor testimony—its only extrinsic evidence—fails for the same reason as with enablement. Appx36. The inventors merely confirmed the lack of actual reduction to practice for non-carbon-block media types, that they "didn't develop any prototypes" using other filter media types. Appx22202-22206; Appx32720, Appx32983; Appx32227; Appx32495-32497. And they confirmed that prior-art filters—i.e., "current granular media solutions at the time"—were outside the claims' scope. Appx32708. None of that testimony supports the Commission's conclusion that the patent's description was inadequate despite expressly describing an invention applicable to enumerated and well-known filter media types. Indeed, none of that testimony was about the patent's description at all. Yet the written-description "test requires an objective inquiry into the four

corners of the specification," not inventors' subjective state of mind. *Ariad*, 598 F.3d at 1351.

Neither of the decisions relied on by the Commission supports its conclusion. Appx37-38 (citing *Idenix Pharms. LLC v. Gilead Scis. Inc.*, 941 F.3d 1149, 1164 (Fed. Cir. 2019); *Nuvo Pharms. (Ireland) Designated Activity Co. v. Dr. Reddy's Lab'ys Inc.*, 923 F.3d 1368, 1381 (Fed. Cir. 2019)). Both *Idenix* and *Nuvo* involved facts worlds apart from anything here. *Idenix* was a claim to a novel chemical genus potentially including billions of compounds described only functionally. 941 F.3d at 1164. *Nuvo* was similar: a pharmaceutical compound claim covering any therapeutically effective amount of a substance—even though skilled artisans would not have expected that substance to be effective and the patent never actually described it as such. 923 F.3d at 1377, 1379-81. Neither decision addressed claims and a description like those here, which involve an admittedly well-known genus in the predictable mechanical arts. The Commission's reliance on such inapposite precedent only underscores its misinterpretation of what Section 112 requires.

Simply, the Commission's flawed reading of plain intrinsic evidence and reliance on inapposite inventor testimony require reversal on written description.

III. THE COMMISSION ERRED IN HOLDING THE CLAIMS INVALID FOR INDEFINITENESS DESPITE THEIR CLEAR CLAIM SCOPE

A. Intrinsic And Extrinsic Evidence Supports The Same Claim Meaning With Reasonably Certain Scope

Claim text need only inform persons of ordinary skill in the relevant art with "reasonable certainty" about an invention's scope. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Claims clear that low threshold when an ordinarily skilled artisan reading the claims "in light of the rest of the patent and the knowledge" in the art would have a "reasonably certain understanding of what" they mean. *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365-66 (Fed. Cir. 2017). Patent challengers bear the burden of proving otherwise by clear-and-convincing evidence. *Id.*; *Ajinomoto*, 932 F.3d at 1352.

To those of ordinary skill in the art, the claim phrase here is readily understandable with reasonably certain scope. It recites: "L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)." Appx423(col.34:7-26). As respondents conceded, the meaning of that text standing alone is "plain": it means the usage lifetime a manufacturer or seller "elects to present," such as "on product packaging" or in other "advertising." Appx7143-7148 (repeatedly acknowledging this "plain" meaning). This plain claim text thus defines the required "filter usage lifetime" as the stated number of gallons of water for which the filter

can be used before replacement. Appx423(col.34:7-26); Appx7143-7148; *see* Appx419(col.26:8-11).

The "surrounding words" in claim 1 "also must be considered" and are "highly instructive." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314-15 (Fed. Cir. 2005) (en banc; citation omitted). Claim 1 is directed to a "gravity-fed water filter" with a "lead scavenger" for removing lead. Appx423(col.34:7-26). The filter has an "effluent lead concentration at end of lifetime" based on a specific measurement involving source water prepared with specified levels of both "soluble" and "colloidal lead." Appx423(col.34:7-26). Given that context, an ordinarily skilled artisan would understand that the recited "filter usage lifetime" is based on the filter's ability to reduce lead, verified through testing of the effluent lead concentration by the manufacturer or seller. Appx423(col.34:7-26). Thus, as the ALJ recognized, the language of the claim as a whole has a clear meaning to one of ordinary skill in the art and conveys that a "filter usage lifetime claimed by a manufacturer or seller of the filter" is the "total number of gallons of water that a manufacturer or seller has validated can be filtered before the filter is replaced." Appx4529-4535.

The "context of the entire patent" points to the same reasonably certain meaning. *Phillips*, 415 F.3d at 1313-15. The patent expressly defines "filter usage lifetime" with a definition that matches the plain claim text: "The filter usage

lifetime (L) is defined as the total number of gallons that can be effectively filtered according to claims presented by the manufacturer or seller of the filter." Appx419(col.26:6-8). Like the claim text, that definition makes controlling the manufacturer/seller-presented lifetime. Appx419(col.26:6-8). And like the claim text, the definition recognizes that manufacturers and sellers present a filter's lifetime based on verification using objective measurements, the "number of gallons that can be *effectively* filtered." Appx419(col.26:6-8) (emphasis added). The specification incorporates the industry standard protocol for measuring filter performance in removing lead, describing filters as having "been found to perform effectively in water filtration" based on "obtaining lead removal results that meet the recent NSF Standard 53 for lead in drinking water." Appx418-419(col.23:26-32), (col.26:18-29) (incorporating standard and specifying where to obtain it).

Intrinsic and unrebutted extrinsic evidence also show that "filter usage lifetime" is a well-understood concept in this industry, adding to the claims' reasonably certain scope. The specification explains that manufacturers and sellers "[t]ypically" include claims about filter usage lifetime "on the product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed." Appx419(col.26:6-18) ("may also be presented in the manufacturer's or seller's advertising"). The specification explains that, in this industry, filter usage lifetime claims "typically bear some relationship to some

performance attribute of the filter." Appx419(col.26:6-18). And they "[t]ypically" "require a substantiation process, and in some cases, a competitor may be able to challenge such claims in a judicial or non-judicial process." Appx419(col.26:6-18). That description about what is typically done in this industry corroborates the claim text's plain meaning.

So does other intrinsic evidence of industry practice. The incorporated NSF/ANSI 53 standard requires manufacturers to provide purchasers with a "rated service life" or "capacity" for a filter, stated in "liters" or "gallons." Appx32126-32127, Appx32130, Appx32158. It defines those terms as "[t]he rated service cycle" of "water treated by a system, between servicing of the media (cleaning, regeneration, or replacement), as specified by the manufacturer." Appx32052. It also adopts testing protocols for lead reduction performance to be "verified and substantiated." Appx32118, Appx32124. And it prohibits a manufacturer or seller from "claim[ing] a capacity or service life greater than the least reduction capacity or service life that has been verified through testing." Appx32127. As the ALJ found, skilled artisans would have been "aware of the NSF/ANSI 53 standard" even aside from its incorporation by reference into the patent. Appx4530-4532. Because that standard used terms just like the claims' text—including the "life" of a filter and what a manufacturer may "claim" about it—the ALJ recognized the standard

provided important context for understanding the claims' meaning. Appx4530-4532; Appx32126-32127, Appx32130.

Extrinsic evidence points to the same conclusion. Some states, like Iowa and California, require certification under industry standards before a filter can be sold in that state. *See* Iowa Admin. Code Ch. 14; Cal. Health & Safety Code § 116825. And at the national level, Federal Trade Commission Guidelines require advertisers to "have evidence to back up their claims" about a product; "health or safety claims" in particular are scrutinized and must be supported by "competent and reliable scientific evidence." Appx31247-31252; Appx32158-32160. This evidence is important "background on the technology" that both illuminates the claims' meaning and confirms their reasonably certain scope. *Phillips*, 415 F.3d at 1318.

This intrinsic and extrinsic evidence paint a crystal-clear picture and show the claim text informs ordinarily skilled artisans of the claims' scope with more than reasonable certainty.

B. The Commission Misinterpreted Plain Claim Text, Relied On Unrelated Case Law, And Wrongly Put The Burden On Brita To Prove Its Claims Valid

1. The Commission wrongly treated objective claim terms as subjective, which alone requires reversal

In the face of this overwhelming intrinsic and extrinsic evidence of claim definiteness, the Commission created ambiguity where there is none. It hinged its indefiniteness holding on a plain misinterpretation of the claim text—that the claims

use "subjective language." Appx16-27. The Commission thought the phrase "claimed by" was "subjective" and left the claims' scope dependent "'on the unpredictable vagaries of any one person's opinion.'" Appx18-20, Appx27 (quoting *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1353 (Fed. Cir. 2015); emphasis omitted).

But a filter usage lifetime "claimed by" a manufacturer or seller is objective, not subjective. Even the Commission's cited dictionary definitions disprove its view. The Commission cited the Oxford English Dictionary's definition of "claim" as "[c]ontend, maintain, assert" and the American Heritage definition as "to state to be true, especially when open to question." Appx17 n.12. What a manufacturer or seller has "asserted" or "stated to be true" about a filter's usage lifetime is an objective fact—for example, a filter's packaging either states that the filter should be replaced after 40 gallons or it does not. That is doubly true in the context here, where assertions about filter usage lifetime must be validated. *Supra* pp. 46-48. The Commission noted that the claim "does not use the objective word[] 'validate' or a similar term," but never addressed the surrounding claim text specifying a testing protocol for the "effluent lead concentration at end of lifetime L" and similar descriptions in the specification. Appx18; Appx423(col.34:7-26).

This objective claim language is a far cry from the language in *Datamize* or the other decisions the Commission cited. Appx20 (also citing, *e.g.*, *Interval*

Licensing LLC v. AOL, Inc., 766 F.3d 1364, 1371 (Fed. Cir. 2014)). The claims in *Datamize* recited an interface with elements that created an "*aesthetically pleasing* look and feel." 417 F.3d at 1348-49 (emphasis in *Datamize*). But whether an interface was "aesthetically pleasing" was "completely dependent on a person's subjective opinion." *Id.* at 1350. *Interval Licensing* addressed the same problem, this time in the context of claims to displaying content on a display "in an unobtrusive manner that does not distract." 766 F.3d at 1367-68. Whether "'something distracts a user'" was "highly subjective" and "'depends on the preferences of the particular user.'" *Id.* at 1371. Yet here, whether the filter usage lifetime "claimed by" a manufacturer or seller is 40 gallons or 400 gallons suffers from no similar defect. It turns instead only on objective facts, such as what is presented on the filter's packaging, user manual, or in advertising.

The Commission never expressly articulated what was subjective about the claims' scope here. Appx16-27. It focused on the "pure subjectivity by which a manufacturer or seller can claim a filter usage lifetime." Appx27. But the fact that a manufacturer can choose what usage lifetime to claim and validate does not make the language of the patent claims' indefinite; rather, the plain text of the claims makes reasonably certain whether any particular choice will fall within (or outside) their scope. In that way, the claim requirement here is similar to one requiring that electrodes be "in a 'spaced relationship' with each other." *Biosig Instruments, Inc.*

v. Nautilus, Inc., 783 F.3d 1374, 1376-77 (Fed. Cir. 2015). Whether to place electrodes in a spaced relationship and, if so, how to space them was a manufacturer's choice. *Id.* But that was no more a reason for indefiniteness in *Biosig* than it is here. *See id.* at 1383-84 (holding claims not indefinite).

Because the Commission was express that its indefiniteness holding was based on the purported "pure subjectivity" of the claims, its error in treating the claims as subjective alone requires reversal on this issue. Appx18, Appx20, Appx27.

2. The Commission further erred in misinterpreting intrinsic evidence and putting the burden on Brita to prove lack of indefiniteness

Further errors also warrant reversal. *First*, the Commission wrongly dismissed intrinsic evidence about industry practice and overlooked unrebutted extrinsic evidence of the same. The Commission dismissed the specification's discussion of what is "typically" done in this industry as "permissive, not mandatory." Appx18-23. But that misses the point. A claim term must be given the ordinary "meaning that the term would have to a person of ordinary skill in the art in question." *Phillips*, 415 F.3d at 1312-13. Industry practice, especially when detailed in the intrinsic record itself, is thus highly relevant to understanding claims' meaning. *Id.*; *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1368-69 (Fed. Cir. 2011) (reversing district court indefiniteness decision that failed to account for "well-known practice" in the relevant field). There is no requirement that industry

practice be mandatory for it to be relevant to understanding a claim's scope. *Phillips*, 415 F.3d at 1312-13; *Wellman*, 642 F.3d at 1368-69.

Second, the Commission muddled the relevant dates. As already explained, the '141 patent incorporates by reference the 2007 NSF/ANSI 53 standard, which further details industry practice in this field, including standards for validating and claiming filter lifetime. Appx418-419(col.23:26-32), (col.26:18-29); *supra* pp. 45-47. The Commission thought this intrinsic evidence of industry practice should be dismissed because it post-dates the relevant period for claim construction: "the earliest priority date of the '141 patent is July 25, 2006," which "predates" the February 5, 2007 date of the NSF/ANSI standard. Appx23 (quoting Appx197; alteration omitted); Appx30562. But the Commission was wrong about which date matters for claim construction. Although 2006 was the earliest date the ALJ found for conception and reduction to practice (Appx197-217), the relevant date for claim construction is different: "the effective filing date *of the patent application*." *Phillips*, 415 F.3d at 1313 (emphasis added). In an undisturbed finding, the ALJ found that date was October 29, 2007, which is after the February 2007 date of the NSF/ANSI 53 standard. Appx197; Appx30562. The incorporated NSF/ANSI 53 standard is thus relevant evidence of industry practice predating the effective filing date for the '141 patent.

Third, the Commission also dismissed the NSF/ANSI 53 standard because limiting the claims to that standard would purportedly "exclude[] the preferred embodiment" of the invention from the claims' scope. Appx23-25 (quoting *SynQor, Inc. v. Artesyn Techs., Inc.*, 709 F.3d 1365, 1378-39 (Fed. Cir. 2013)). It pointed to one of nine multiple-core filters with lead-sorbent in Table 5, PT3-6. Appx23-25. The table lists a lifetime (L) of 40 gallons for that filter but an effluent lead concentration at end of lifetime (c_e) of 13.3 µg/liter, exceeding the standard's 10 µg/liter limit. Appx423(col.33:15-55).

But as Brita explained and the Commission ignored, the claims are not limited to the NSF/ANSI 53 standard; that standard merely provides a "default method" for manufacturers to validate filter-usage-lifetime claims. Appx7072; Appx4531-4532 (ALJ explaining same); *see* Appx24 (Commission wrongly stating "*Markman* Order" "inserted" NSF/ANSI 53 standard into "definition of 'lifetime'"). Thus, just as with the Commission's dismissal of what is "typically" done in the industry, the Commission's reasoning about the NSF/ANSI 53 standard misunderstood its relevance, which was to show the industry practice that informs how persons of skill would understand the claim language here. In any event, nothing in the '141 patent describes PT3-6 as a "preferred" embodiment, let alone "the" preferred embodiment of the invention. *See SynQor*, 709 F.3d at 1378-39 (adopting construction that "encompasses *the* preferred embodiment"; emphasis added). And regardless, the

Commission was wrong that reading the claims to require validation using the NSF/ANSI 53 standard would exclude the PT3-6 example from the claims' scope. Appx23-25. At most, it would mean that a commercial embodiment of the prototype might have a validated filter usage lifetime less than the estimated 40 gallons listed in Table 5. Yet even if the validated lifetime were only 20 gallons, that would merely double the FRAP factor listed in Table 5 from 78.5 to 157, which is still well below 350 and thus within the claims' scope. Appx423, Appx425-426 (col.33:25-35; certificate of correction).

Fourth, the Commission's other criticisms of the NSF/ANSI 53 standard are beside the point and wrong to boot. The Commission reasoned that the standard was not relevant because it "is subject to change," which the Commission thought meant the claims' scope would "vary based upon the version of the NSF/ANSI 53 protocol that one relies upon." Appx25-27. But any such change would not undermine the relevance of the standard in demonstrating the relevant time-of-patenting industry practice for validating and making claims about filter usage lifetime data. *Phillips*, 415 F.3d at 1313 (claim construction based on filing date). There is no dispute that those facts about industry practice remain just as true today as in 2007, nor did the Commission cite evidence showing any material variation in the standard. Appx25-27. Yet actual evidence that methodological differences produce material changes in claim scope "was central" to this Court's indefiniteness holding "in cases such as

Dow Chem. Co. v. Nova Chems. Corp. (Can.)," the decision to which the Commission wrongly analogized this case. *BASF*, 875 F.3d at 1366 (citing 803 F.3d 620, 633-35 (Fed. Cir. 2015)); Appx20, Appx25-27. And even were there meaningful differences in the versions of the NSF/ANSI 53 standard, that would not suggest claim indefiniteness—the claim scope would still be fixed to the filter usage lifetime "claimed by" the manufacturer or seller based on whichever validation method was used.

Finally, the Commission shifted the burden to Brita to prove its claims not indefinite and relied on speculation in lieu of clear-and-convincing evidence. The Commission was express that it held the claims invalid because "Brita's arguments and evidence fail to cabin the lifetime 'claimed by a manufacturer or seller.'" Appx27. The Commission said almost nothing about evidence or argument from respondents purportedly supporting indefiniteness. Appx16-27. It instead focused on "Brita's evidentiary basis," what it believed "Brita ha[d] failed to establish," and whether there was sufficient evidence "introduced into the record by Brita" to support claim definiteness. Appx16-27. And in the face of Brita's actual intrinsic and extrinsic evidence, the Commission turned to speculation, such as "potential variation in methodology" for measuring filter usage lifetime, the possibility that "lifetime could also depend on what contaminant is being filtered," that the claims "could cover lifetimes" in supposedly "undisclosed places," and many other "could"

scenarios that the Commission imagined. Appx16-27. Such unsupported speculation is reversible error. *BASF*, 875 F.3d at 1366.

* * * * *

For any and all of these reasons, the Commission's indefiniteness holding should be reversed. And once indefiniteness is set aside, the ALJ's plain-and-ordinary-meaning construction should be reinstated, as respondents failed to preserve any argument for an alternative construction. Appx4529-4535 (noting respondents' only challenge was indefiniteness).

CONCLUSION

The Commission's invalidity determinations should be reversed and the case remanded, including for the Commission to address the remedy issues it did not previously reach given its invalidity determinations.

Dated: March 15, 2024

Respectfully submitted,

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NON-CONFIDENTIAL ADDENDUM

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN HIGH-PERFORMANCE GRAVITY-FED WATER FILTERS AND PRODUCTS CONTAINING THE SAME**	**Investigation No. 337-TA-1294**

COMMISSION OPINION

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I. INTRODUCTION

On June 28, 2023, the Commission determined to review in part the final initial determination ("ID") issued by the presiding administrative law judge ("ALJ") on February 28, 2023, finding a violation with respect to claims 1, 2-6 and 23 of U.S. Patent No. 8,167,141 ("the '141 patent"). 88 Fed. Reg. 42950-53 (July 5, 2023). On review, the Commission has determined to reverse the ID's finding that there has been a violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337. Specifically, the Commission has determined to: (1) vacate the ID's construction of the claim term "filter usage lifetime claimed by a manufacturer or seller of the filter" and find that claim limitation indefinite; (2) reverse the ID's finding that the asserted claims are not invalid for lack of written description; (3) reverse the ID's finding that the asserted claims are enabled; (4) take no position on the ID's section 101 analysis and findings; (5) take no position on the ID's section 102 analysis and findings; and (6) take no position on the ID's findings on the economic prong of the domestic industry requirement. Because the Commission finds each of the asserted claims invalid, it accordingly finds no violation of section 337.

This opinion sets forth the Commission's reasoning in support of that determination. The Commission adopts the remainder of the ID that is not inconsistent with this opinion.

II. BACKGROUND

A. Procedural History

On January 31, 2022, the Commission instituted this investigation based on a complaint filed by Brita LP ("Brita") of Neuchatel NE, Switzerland. 87 Fed. Reg. 4913 (Jan. 31, 2022). The complaint, as supplemented, alleged violations of section 337 based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain high-performance gravity-fed water filters and products containing the

same by reason of infringement of claims 1-6, 20, 21, 23, and 24 of U.S. Patent No. 8,167,141 ("the '141 patent"). *Id.* The Commission's notice of investigation named nine respondents: Mavea LLC of West Linn, Oregon and Brita GmbH of Taunusstein, Switzerland (collectively, "the Mavea Respondents"); Ecolife Technologies, Inc. of City of Industry, California and Qingdao Ecopure Filter Co., Ltd. of Shandong Province, China (collectively, "the Aqua Crest Respondents"); Kaz USA, Inc. and Helen of Troy Limited, both of El Paso, Texas (collectively, "the PUR Respondents"); Zero Technologies, LLC of Trevose, Pennsylvania and Culligan International Co. of Rosemont, Illinois (collectively, "the ZeroWater Respondents"); and Vestergaard Frandsen Inc. of Baltimore, Maryland ("Vestergaard" or "LifeStraw"). *Id.* The Office of Unfair Import Investigations is not participating in this investigation. *Id.*

The Mavea Respondents were terminated from the investigation based upon settlement, and the Aqua Crest Respondents were terminated based upon withdrawal of the allegations in the complaint. Order No. 13 (May 3, 2022), *unreviewed by* Comm'n Notice (May 24, 2022); Order No. 43 (Sept. 22, 2022), *unreviewed by* Comm'n Notice (Oct. 11, 2022). Claims 20, 21, and 24 of the '141 patent were terminated from the investigation based upon withdrawal of the allegations in the complaint as to these claims. Order No. 19 (June 1, 2022), *unreviewed by* Comm'n Notice (June 21, 2022).

On June 2, 2022, the ALJ held a *Markman* hearing. The ALJ issued a *Markman* Order construing the claim terms in dispute on July 20, 2022. Order No. 30 (July 20, 2022).

The ALJ held an evidentiary hearing from August 17-19, August 22-23, and October 13, 2022, and received post-hearing briefs thereafter.

On February 28, 2023, the ALJ issued the final ID finding a violation of section 337. The ID found that by appearing and participating in the investigation, the parties have consented to

personal jurisdiction at the Commission. ID at 12. The ID further found that "because of importation stipulations of all Accused Products," the importation requirement under 19 U.S.C. § 1337(a)(1)(B) is satisfied and that the Commission has *in rem* jurisdiction over the accused products. *Id.* at 12-13. The ID found that Brita successfully proved that the accused products infringe the asserted claims of the '141 patent (claims 1-6 and 23). ID at 69-105. The ID further found that Respondents failed to show by clear and convincing evidence that the asserted claims are invalid for lack of written description (ID at 169-204), enablement (ID at 205-250), anticipation (ID at 153-169), or for reciting patent ineligible subject matter under 35 U.S.C. § 101 (ID at 250-269). Finally, the ID found that Brita proved the existence of a domestic industry that practices the '141 patent as required by 19 U.S.C. § 1337(a)(2). *Id.* at 105-117, 269-285.

The ID included the ALJ's recommended determination on remedy and bonding ("RD"). The RD recommended, should the Commission find a violation, the issuance of a limited exclusion order against all respondents and cease and desist orders against the PUR Respondents and LifeStraw. ID/RD at 258-291. The RD also recommended imposing a bond in the amount of one hundred percent (100%) of entered value for the PUR Respondents' and the ZeroWater Respondents' infringing products imported during the period of Presidential review and $6 per unit for infringing LifeStraw products imported during the period of Presidential review. *Id.* at 291-295.

On March 13, 2023, Respondents and Brita filed respective petitions for review of the

ID.[1] On March 21, 2023, the parties filed responses to the petitions.[2]

On May 24, 2023, Respondents moved for leave to file a notice of supplemental authority in support of their petition for review. Specifically, Respondents sought to submit the recent U.S. Supreme Court decision in *Amgen Inc. v. Sanofi*, No. 21-757 (May 18, 2023), as being directly relevant to the lack of enablement of the asserted claims in this investigation. On June 28, 2023, the Commission issued a Notice granting the motion. 88 Fed. Reg. 42951 (July 5, 2023).

In its Notice on June 28, 2023, the Commission also determined to review the final ID in part. *Id.* at 42950-53. Specifically, the Commission determined to review the following findings: (1) construction of the claim term "filter usage lifetime claimed by a manufacturer or seller of the filter," (2) written description, (3) enablement, (4) section 101, (5) anticipation, and (6) the economic prong of the domestic industry requirement. The Commission requested the parties to brief certain issues under review and requested the parties, interested government agencies, and other interested parties to brief the issues of remedy, the public interest, and bonding. *Id.*

On July 14, 2023, the parties filed initial submissions in response to the Commission's

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[1] *See* Respondents' Petition for Review of the Final Initial Determination ("Resp. Pet."); Complainant Brita LP's Petition for Commission Review of Initial and Recommended Determination ("Brita Pet.").

[2] *See* Complainant Brita LP's Response to Respondents' Petition for Review of Initial Determination ("Brita Rep."); Respondents' Response to Complainant's Petition for Review ("Resp. Rep.").

request for briefing.[3] On July 21, 2023, the parties filed reply submissions.[4]

On July 24, 2023, Complainant Brita filed a motion to strike waived arguments and new evidence in Respondents' Reply in Response to the Commission Notice of Review.[5] Brita argues that Respondents added a new argument regarding the disputed claim construction for the "lifetime"[6] term that attempts to distinguish "claimed" and "validated." Motion to Strike at 3. Brita also argues that Respondents reference new evidence in the form of various lay dictionary definitions of the words "claim" and "validate" that were never cited during the investigation. *Id.* In addition, Brita argues that Respondents now contend, for the first time, that the RD's recommendation of a 100% bond for the PUR Respondents' and the ZeroWater Respondents' products should not be adopted because Brita did not show that a purported reasonable royalty from a license of the asserted patent was not a proper basis for a bond as to the PUR and ZeroWater Respondents. *Id.* at 5. Brita also argues that Respondents misrepresent the licensing agreement that they rely upon for a smaller bond, saying that Respondents assert that Brita is paid under the agreement, when in fact, it is a cross-license agreement where Brita pays the licensee for use of the licensee's patents. *Id.*

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[3] *See* Complainant Brita LP's Statement on Remedy, the Public Interest, and Bonding ("Brita Sub."); Respondents' Response to the Commission Notice of Review ("Resp. Sub.").

[4] *See* Complainant Brita LP's Reply to Respondents' Statement on Remedy, the Public Interest, and Bonding ("Brita R. Sub."); Respondents' Reply in Response to the Commission Notice of Review ("Resp. R. Sub.").

[5] *See* Complainant Brita LP's Motion to Strike Waived Arguments and New Evidence in Respondents' Reply in Response to the Commission Notice of Review ("Motion to Strike").

[6] The term "lifetime" is used herein as shorthand for the claim limitation "filter usage lifetime claimed by a manufacturer or seller of the filter."

PUBLIC VERSION

On August 3, 2023, Respondents filed an opposition to Brita's motion.[7] Respondents assert that "to the extent that pointing out well-known dictionary definitions is 'new,' it is directly responsive to the Commission's question, and the Commission may nonetheless examine these definitions to the extent necessary to confirm Brita is incorrect on this point." Opposition to Motion to Strike at 1-2. With respect to bond, Respondents contend that Brita misconstrues its own license agreement to make it seem irrelevant as to whether a reasonable royalty rate can be ascertained. *Id.* at 2.

On August 8, 2023, Brita moved for leave under Commission Rule 210.15(c) to file a reply to Respondents' opposition.[8] Brita contends that good cause exists "to address misstatements and baseless arguments in Respondents' Opposition." Reply to Opposition at 1. Specifically, Brita asserts that "Respondents falsely claim they were entitled to present these new arguments and evidence because Brita purportedly raised new arguments in its own briefing in response to the Commission's Notice." *Id.* at Attachment A.

On August 18, 2023, Respondents filed an opposition to Brita's motion, arguing that "Brita's Motion is devoid of 'good cause,' or any other justification needed to support its request to deviate from the standard motion practice and allowing the filing of a reply."[9]

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[7] *See* Respondents' Opposition to Brita LP's Motion to Strike Waived Arguments and New Evidence in Respondents' Reply in Response to the Commission Notice of Review ("Opposition to Motion to Strike").

[8] *See* Complainant Brita LP's Reply in Support of its Motion to Strike Waived Arguments and New Evidence in Respondents' Reply in Response to the Commission Notice of Review ("Reply to Opposition").

[9] *See* Respondents' Opposition to Brita LP's Motion for Leave to Submit Reply in Support of Its Motion to Strike Waived Arguments and New Evidence in Respondents' Reply in Response to the Commission Notice of Review.

The Commission has determined to grant Brita's Motion to Strike as it pertains to Respondents attempt to introduce in their Reply certain dictionary definitions of "validate" and "claimed" for being waived. The Commission made clear in its notice that responses to its questions were limited to the existing evidentiary record. 88 Fed. Reg. at 42951. In addition, Respondents failed to present the dictionary definitions to the ALJ and failed to present them in their petition for review or initial submission to the Commission. The Commission has determined to deny Brita's motion as to Respondents' bond argument. Bond is determined by the Commission based on the full record of the investigation. The ALJ's bond recommendation in the RD includes findings based on evidence presented by the parties as well as the ALJ's recommendation as to bond amount. The Commission takes into account the RD, the arguments of the parties before the ALJ, and considers other information and arguments submitted into the record by the parties, interested government agencies, and other interested parties in response to the Commission's notice seeking submissions on remedy, bonding and the public interest. The Commission has also determined to reject Brita's motion for leave to file a reply to Respondents' opposition as unnecessary.

B. Overview of the Technology

The technology at issue generally relates to gravity flow water filtration systems used for removing undesirable contaminants. '141 patent (JX-0022); ID at 15-16. Two basic types of household water filter systems are known in the art: (1) a pressurized system, such as a filter mounted to a faucet; and (2) a low-pressure system that operates under the force of gravity as water flows through a filter into a water collection receptacle. ID at 16; '141 patent at 1:33-39. The patent relates to the second type.

The ’141 patent, entitled “Gravity Flow Filter,” was filed on September 9, 2008, as U.S. Patent Application No. 12/207,284 (“the ’284 application”). The patent issued on May 1, 2012, and names multiple inventors, including Elizabeth Knipmeyer, who testified on behalf of Complainants. ’141 patent. The patent “relates to carbon block and granular filters having rapid flow rates and excellent filtration performance.” ’141 patent at 1:16-18. The patent describes a gravity-fed carbon block water filter that utilizes “multiple sub-blocks each comprising filter media walls surrounding and defining a cavity receiving fluid.” ’141 patent, Abstract. “Each of the sub-blocks is connected to at least one other of the sub-blocks by filter media of which the filter block is made.” *Id.* The patent discloses that, “[i]n one approach, the filter media includes about 20-90 wt % activated carbon, and about 5-50 wt % binder” and that, “[i]n another approach, a lead concentration in a final liter of effluent water filtered by the filter is less than about 10 ug/liter after about 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 ppb total lead with 30-60 ppb being colloidal lead greater than 0.1 um in diameter.” *Id.* In this investigation, Brita asserts independent claim 1 and dependent claims 2-6 and 23. ID at 4.

C. The Accused Products and Domestic Industry Products

The accused products are gravity flow water filtration systems that allegedly meet the limitations recited in the asserted claims. Brita accuses multiple products from each of the Respondents of infringing the asserted claims. A complete listing of which Respondents’ products are accused of infringing specific asserted claims can be found in the ID at pages 21-25.

For the domestic industry, Brita identifies its (i) Brita LongLast Product; and (ii) Brita LongLast+ Product (recently rebranded as “Elite”) as practicing the ’141 patent. ID at 25.

III. Commission Review of the ID

When the Commission reviews an initial determination, in whole or in part, it reviews the determination *de novo*. *Certain Soft-Edged Trampolines and Components Thereof*, Inv. No. 337-TA-908, Comm'n Op. at 4 (May 1, 2015). Upon review, the "Commission has 'all the powers which it would have in making the initial determination,' except where the issues are limited on notice or by rule." *Certain Flash Memory Circuits & Prods. Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n Op. at 9-10 (July 1997) (quoting *Certain Acid-Washed Denim Garments & Accessories*, Inv. No. 337-TA-324, Comm'n Op. at 5 (Nov. 1992)). With respect to the issues under review, "the Commission may affirm, reverse, modify, set aside or remand for further proceedings, in whole or in part, the initial determination of the administrative law judge." 19 C.F.R. § 210.45(c). The Commission also "may take no position on specific issues or portions of the initial determination," and "may make any finding or conclusions that in its judgment are proper based on the record in the proceeding." *Id.*; *see also Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984).

IV. Analysis

A. Issues Under Review

The Commission determined to review the *Markman* Order's construction of one claim limitation: "filter usage lifetime claimed by a manufacturer or seller of the filter." 88 Fed. Reg. 42950-53 (July 5, 2023). The Commission thus adopts the ID's construction of the other claim limitations in the *Markman* Order. As to invalidity, the Commission determined to review the ID's findings on written description, enablement, section 101, and section 102. *Id.* As discussed below, the Commission reverses the ID's findings as to written description and enablement, and takes no position on the ID's findings on sections 101 and 102. The Commission also determined to review the ID's findings on the economic prong of the domestic industry

requirement. *Id.* On review, the Commission takes no position on the ID's economic prong findings.

B. Claim Construction and Indefiniteness of the Claim Term "Filter Usage Lifetime Claimed by a Manufacturer or Seller of the Filter"

The Commission determined to review the ID's construction of the claim term "filter usage lifetime claimed by a manufacturer or seller of the filter." 88 Fed. Reg. 42950-53 (July 5, 2023). On review, the Commission has determined to vacate the ID's construction and find the claim limitation indefinite.[10]

Independent claim 1 recites:

> 1. A gravity-fed water filter, comprising:
>
> a filter media including at least activated carbon and a lead scavenger, wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:
>
> $$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$
>
> where:
>
> V = volume of the filter media (cm3),
>
> f = average filtration unit time over lifetime L (min/liter),
>
> c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter, and
>
> ***L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)***.

[10] As set forth *infra*, n.11, Commissioner Stayin would affirm the ID's construction of this claim term, and the finding that the term is not indefinite.

'141 patent, claim 1 (emphasis added). The claim relates to FRAP performance testing and the definition of the variables that are used to calculate the FRAP value of a filter media. As noted, claims 2-6 and 23 depend from claim 1.

1. Legal Standard

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Claim construction is a question of law but may depend on "factual underpinnings" such as the understanding of a person of ordinary skill in art at the time of the invention. *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 331-32 (2015). Claim construction focuses on the intrinsic evidence, which consists of the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *Markman v. Westview Instr., Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc). The Federal Circuit explained in *Phillips* that tribunals must analyze the intrinsic evidence to determine the "ordinary and customary meaning of a claim term" as understood by a person of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1313. "Such intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language." *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Grp., Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001).

"Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claims terms." *Phillips*, 415 F.3d at 1314; *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001) ("In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to 'particularly point [ ] out and distinctly claim [ ] the subject matter which the patentee regards as

his invention.'"). Further, "the specification 'is always highly relevant to the claim construction analysis. Usually it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs." *Id.* at 1316.

In addition to the claims and the specification, the prosecution history should be examined, if in evidence. *Phillips*, 415 F.3d at 1317. The prosecution history can "often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317; *see Chimie v. PPG Indus. Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005). When the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence (*i.e.*, all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony, and learned treatises) may be considered. *Phillips*, 415 F.3d at 1317. As the Supreme Court has explained, while claim construction is a question of law, it may depend on "factual underpinnings," such as the understanding of an ordinarily skilled artisan. *Teva*, 574 U.S. at 331-32.

If, however, a person of ordinary skill in the art reading the claim in light of the specification and prosecution history is unable to ascertain with "reasonable certainty" the scope of the invention, the patent claim is invalid for indefiniteness. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910-11 (2014). In other words, a patent claim must "inform

those skilled in the art about the scope of the invention with reasonable certainty" to avoid being indefinite. *Id*.

2. The ID

The ALJ found that the language of the claims and the specification support Brita's proposed construction of "filter usage lifetime claimed by a manufacturer or seller of the filter" to mean "[t]he total number of gallons of water that a manufacturer or seller has validated can be filtered before the filter is replaced." *Markman* Order (Order No. 30) at 14. In construing the limitation, the ALJ noted that, consistent with the specification, "[c]laim 1 defines the filter usage lifetime in gallons ('L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)).'" *Id.* at 14-15 (citing '141 patent at 34:25-26; 12:27-28; 26:6-8 (reciting "lifetime … is defined as the total number of gallons that can be effectively filtered..."), 23:26-32 (reciting the filters "have been found to perform effectively in water filtration, including obtaining lead removal results that meet the recent NSF Standard 53 for lead in drinking water")). The ALJ further noted that "[t]he '141 patent describes the NSF/ANSI 53 standard, where it can be located, and the purpose of incorporating by reference to provide 'FRAP performance testing' that may use the 'requirements and procedures' of the standard to calculate the lifetime as part of the FRAP formula" and that "[b]ecause the NSF/ANSI 53 standard is incorporated by reference, it is also intrinsic evidence available for claim construction." *Id.* at 15 ("This is incorporation by reference with sufficient particularity.") (citing '141 patent at 26:22-29); *Zenon Env't, Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378-79 (Fed. Cir. 2007)).

The ALJ rejected Respondents' argument that "the lifetime limitation is indefinite because a method of calculating a filter's lifetime is not described in the '141 patent," finding that "[b]ecause the NSF/ANSI 53 standard is incorporated by reference, the patent explains at least a default method to calculate the lifetime as described in the NSF/ANSI 53 standard." *Id.* at

16-17 (citing JXM-0003.082 at § 7.4.3.6 (describing a protocol test of lead reduction claims)). The ALJ further found that "a person having ordinary skill in the art would understand the NSF/ANSI 53 standard and understand the meaning of 'lifetime,' and determine a method of determining the lifetime." *Id.* at 17.

3. Analysis

The Commission finds that the scope of the claim term, "filter usage lifetime claimed by a manufacturer or seller of the filter," cannot be determined with reasonable certainty and that, as a result, claims 1-6 and 23 are indefinite.[11]

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[11] Commissioner Stayin would affirm the ID's construction of "filter usage lifetime claimed by a manufacturer or seller of the filter," and the related finding that the term is not indefinite. In his view, Respondents waived any objection to the adopted construction. During the *Markman* proceedings, Respondents argued the term was indefinite, but did not offer a contrary construction. *See* Resps.' Joint *Markman* Br. at 15-19; *cf. id.* at 9-14 (arguing the term "volume of the filter media" is indefinite and proposing a construction in the alternative). On reply, Respondents offered a single sentence regarding Complainants' construction. Resps.' Joint *Markman* Reply in Support of Indefiniteness at 12-13 ("Brita's proposed definition is seemingly broader, inserting the term "validated" into its construction . . . which does not appear whatsoever within the '141 patent."). The majority offers no explanation for setting aside the adopted construction despite this waiver, or otherwise crediting arguments that were not presented to the ALJ (including new dictionary definitions). *Cf. Certain Smart Thermostat Sys., Smart HVAC Sys., Smart HVAC Control Sys., & Components Thereof*, Inv. No. 337-TA-1258, Comm'n Op., 2022 WL 2915250, at *10 (July 19, 2022) ("In any event, the Commission also finds that Complainant waived any reliance on its proposed construction . . . for failing to present it before the ALJ.").

Evaluating the "lifetime" term as construed by the *Markman* Order, Commissioner Stayin would affirm the ALJ's finding that the term is not indefinite. The specification identifies one method that may be used to determine the lifetime of a filter, namely the NSF/ANSI 53 protocol. The majority takes issue with the fact that this standard is not *required* by the patent, but the Federal Circuit has held that even if there are multiple measurement techniques, "the mere *possibility* of different results from different measurement techniques" does not render a claim indefinite. *Takeda Pharm. Co. v. Zydus Pharms. USA, Inc.*, 743 F.3d 1359, 1366 (Fed. Cir. 2014) (emphasis added). Respondents offered mere speculation that using the NSF/ANSI 53 protocol for different contaminants *might* result in different lifetimes, but provide no concrete examples. *See Markman* Order at 17. The only example offered by the majority, filter PT3-6 from Table 5 of the '141 patent, at most shows the lifetime stated in the patent was incorrect, not that a person of ordinary skill could not determine the lifetime of that filter. Moreover, this example was raised by Respondents for the very first time in their reply submission to the

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As noted above, the ALJ construed the claim limitation "filter usage lifetime *claimed* by a manufacturer or seller of the filter" to mean "[t]he total number of gallons of water that a manufacturer or seller has *validated* can be filtered before the filter is replaced." *Markman* Order at 14 (emphasis added). As an initial matter, the Commission notes that the difference between the filter usage lifetime being "claimed" and the filter usage lifetime being "validated" is apparent from the plain meaning of those words, and a person of ordinary skill in the art would not exchange those terms as equivalent in meaning without specific guidance or reason to do so from the patent.[12] The ID found reasons to do so in the patent, but the Commission does not find the intrinsic evidence to support this meaning.

Commission, and not before the ALJ or in Respondents' petition for review. Likewise, although the NSF/ANSI 53 protocol has changed over time, neither Respondents nor the majority offer a single concrete example of a filter for which the infringement determination would change depending on the version of the standard used to determine the lifetime. Indeed, the Commission appears to invert the burden of proof by faulting Complainants for not proving the protocol has been consistent over time. *Compare infra*, at 25-26, *with Takeda*, 743 F.3d at 1366 ("As always, the party challenging the patent bears the burden of proving invalidity by clear and convincing evidence."). Accordingly, Commissioner Stayin would find Respondents failed to meet their burden to prove that the asserted claims are invalid, and thus would affirm the ALJ as to that issue.

[12] While the Commission has determined to reject Respondents' attempt to introduce the dictionary definition of "validate" and "claimed" from certain dictionaries, the Commission takes judicial notice of the following definitions of "claimed" and "validate" from the Oxford English Dictionary and the American Heritage Dictionary of the English Language to underscore the plain meaning of "claimed" and "validate." Oxford defines the term "validate" as "[t]o examine for incorrectness or bias; to confirm or check the correctness of"; and the term "claimed" as "[o]ften loosely used (esp. in U.S.) for: Contend, maintain, assert." *validate*. 2023. In *OED.com*. Retrieved September 5, 2023, from oed.com/dictionary/validate; *claimed*. 2023. In *OED.com*. Retrieved September 5, 2023, from https://www.oed.com/dictionary/validate. American Heritage defines "validate" as "to establish the soundness, accuracy, or legitimacy of"; and "claimed" as "to state to be true, especially when open to question." *validate*. 2023. In *ahdictionary.com*. Retrieved September 5, 2023, from https://www.ahdictionary.com/dictionary/validate; *claimed*. 2023. In *ahdictionary.com*. Retrieved September 5, 2023, from https://www.ahdictionary.com /dictionary/validate. *See Philips*, 415 F.3d at 1322–23 (explaining that courts are "free to consult dictionaries . . . at any time . . . and may also rely on dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of

Starting with the language of the claim, the Commission notes that the patentees chose to use the phrase "claimed by," which is subjective language,[13] in the limitation reciting "L-filter usage lifetime *claimed by* a manufacturer or seller of the filter (gallons)." '141 patent at 34:25-26 (emphasis added). The language of claim 1, however, does not specify the sources from which the claimed lifetime must be ascertained or how the claimed lifetime must be determined. In addition, claim 1 does not use the objective word, "validate" or a similar term, which would imply checking the claimed usage lifetime against a standard, benchmark, or other measure.

The specification provides additional information and specifically defines the "lifetime filter usage," stating the "filter usage lifetime (L) is defined as the total number of gallons that can be effectively filtered according to *claims presented* by the manufacturer or seller of the filter." '141 patent at 26:6-8 (emphasis added). The specification then explains where those "claims" by the manufacturer or seller may be found, stating that "*[t]ypically* these *claims* are present on the product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed. The lifetime *claims* may also be presented in the manufacturer's or seller's advertising." '141 patent at 26:8-13.

The '141 patent specification describes that there may be a "substantiation process" to determine the lifetime: "*Typically*, filter usage lifetime claims require a substantiation process, and in some cases, a competitor may be able to challenge such claims in a judicial or non-judicial

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the patent documents"); *Comaper Corp. v. Antec, Inc.*, 596 F.3d 1343, 1348 (Fed. Cir. 2010) ("[I]n determining the ordinary and customary meaning of the claim term as viewed by a person of ordinary skill in the art, it is appropriate to consult a general dictionary definition of the word for guidance."). There is no indication from the intrinsic record that the terms "validate" or "claimed," as used in the '141 patent, are intended to have anything other than their plain and ordinary meaning as reflected in these dictionary definitions.

[13] *See supra* note 12 (defining the term "claim").

process." '141 patent at 26:14–15 (emphasis added)). This description of a substantiation process, however, is permissive according to the specification, and is not required by claim 1.

Further, the specification identifies a protocol that may be used for FRAP performance testing (which requires the measurement of the filter usage lifetime), and while the protocol is incorporated by reference, the protocol is also permissive:

> FRAP performance testing *may be* conducted according to the NSF/ANSI 53 protocol. Requirements and procedures of the NSF/ANSI 53 protocol are available in a document entitled "Drinking water treatment units—Health effects", available from NSF International, 789 North Dixboro Road, P.O. Box 130140 Ann Arbor, Mich. 48113-0140, USA (Web: http://www.nsf.org), and which is herein incorporated by reference.

'141 patent at 26:22-29 (emphasis added). Thus, the Commission finds that nothing in the specification requires substantiation or validation thus undermining the ALJ's construction of the "lifetime" term to require validation. The Commission also notes that nothing in the prosecution history sheds light on the meaning of the term.

In short, because the patentees chose to use the subjective phrase "claimed by," and nothing in the intrinsic record correlates that term with "validation" or requires substantiation,[14] the plain meaning of the language that the patentees deliberately chose to define their invention must be given effect, even if as discussed below it renders the claims indefinite. *White v. Dunbar*, 119 U.S. 47, 52 (1886) ("The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import

[14] As Respondents point out, the evidence shows that in an internal Brita memorandum (CX-0139C), named inventor, Dr. Knipmeyer, proposed a definition that, on its face, would have expressed an objective validation requirement: "filter usage lifetime is defined as the total number of gallons that can be filtered before the filter requires replacement." Tr. (Knipmeyer) at 223:24-224:25); Resp. R. Sub. at 3-4. The patentees, however, chose not to include this type of language in either the specification or the claims.

of its terms."); *Chef Am., Inc. v. Lamb Weston, Inc.*, 358 F.3d 1371, 13734 (Fed. Cir. 2004) ("[C]ourts may not redraft claims, whether to make them operable or to sustain their validity."); *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001) ("In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to 'particularly point [ ] out and distinctly claim [ ] the subject matter which the patentee regards as his invention.'").

The Commission finds the claim, when given its plain meaning, is indefinite because the claim recites a subjective term "lifetime *claimed* by a manufacturer" and neither the intrinsic of the patent nor extrinsic evidence provides an adequate basis to determine the scope of the claim limitation with reasonable certainty. *See, e.g.*, *Dow Chem. Co. v. Nova Chems. Corp. (Canada)*, 803 F.3d 620, 634-35 (Fed. Cir. 2015) ("the existence of multiple methods leading to different results without guidance in the patent or the prosecution history as to which method should be used renders the claims indefinite."); *Datamize, LLC v. Plumtree Software, Inc.*, 417 F. 3d 1342, 1353 (Fed. Cir. 2005) (holding that a claim limitation fails to provide sufficient notice of its scope if it depends "on the unpredictable vagaries of any one person's opinion" and is "purely subjective."); *Morton Int'l, Inc. v. Cardinal Chem. Co.*, 5 F.3d 1464, 1470 (Fed. Cir. 1993) ("[C]laims ... [must be] sufficiently precise to permit a potential competitor to determine whether or not he is infringing."); *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 ("Where, as here, we are faced with a 'purely subjective' claim phrase, we must look to the written description for guidance," and finding the claim indefinite because "sufficient guidance is lacking in the written description of the asserted patents."). While the specification provides additional information, the specification does not provide an adequate basis to determine the scope of the claim limitation with reasonable certainty. In particular, the specification states that

the "filter usage lifetime (L) is defined as the total number of gallons that can be effectively filtered according to claims presented by the manufacturer or seller of the filter." It goes on to state that "*[t]ypically* these claims are present on the product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed" and that "the lifetime claims may also be presented in the manufacturer's or seller's advertising." '141 patent at 26:6-13. These locations are permissive, not mandatory, and the specification leaves open the possibility that the claimed lifetimes may be "presented" in other places or not "presented" at all. In addition, as noted above, while the specification states that FRAP performance testing *may be* done using the NSF/ANSI 53 protocol, nothing in the specification requires use of that protocol.

The ID's rationale for why the "lifetime" limitation is not indefinite provides no reasonable certainty as to the meaning of this limitation. The ALJ, at the suggestion of Brita, relied on the '141 specification's explanation regarding substantiation and its explanation that "FRAP performance testing may be conducted according to the NSF/ANSI 53 protocol" in order to find that the claim is not indefinite. '141 patent at 26:22-29. The ALJ found that "[b]ecause the NSF/ANSI 53 standard is incorporated by reference, the patent explains at least a default method to calculate the lifetime as described in the NSF/ANSI 53 standard." *Markman* Order at 16-17 (citing JXM-0003.082 at § 7.4.3.6 (describing a protocol test of lead reduction claims)). However, as discussed below, the NSF/ANSI 53 standard is insufficient for an ordinarily skilled artisan to ascertain the scope of the limitation with reasonable certainty. JXM-0003.

First, Brita fails to rebut Respondents' showing that a person of ordinary skill in the art would not interpret the "lifetime" claim term as mandating that manufacturers and sellers must implement the NSF/ANSI 53 protocol in their "claimed" filter usage lifetime. Brita asserts

before the Commission that "[u]sers [] rely on the lifetime rating to know when to replace their filters" and that "[u]nder the NSF/ANSI 53 (2007) standard, manufacturers are required to provide a 'rated service life' or 'capacity' for a filter." Brita Rep. at 69 (citing CX-0010.088–089, 092, 120). Brita further contends that "[f]ilters are required to maintain adequate lead reduction performance through the end of their rated service life or capacity" "[a]nd the standard prohibits manufacturers or sellers from 'claim[ing] a capacity or service life greater than the least reduction capacity or service life that has been verified through testing to NSF/ANSI 53.'" *Id.* (citing CX-0010.080, 086, 089). According to Brita, "[t]he NSF standard confirms that the 'lifetime claimed by a manufacturer or seller' recited in the '141 patent refers to a performance claim—such as lead reduction through the rated lifetime—that must be 'verified and substantiated by test data generated under the requirements of NSF/ANSI 53" and that "[v]alidation of filter performance claims throughout a specified lifetime is standard practice in the water filtration industry, as reflected in the '141 patent itself." *Id.* at 69-70 (citing JX-0022 (26:14–17) (noting that "filter usage lifetime claims require a substantiation process"); CX-0010.012, 121). Brita's conjecture as to how a manufacturer or seller might "claim" any particular filter usage lifetime, however, cannot override the intrinsic evidence of the patent, and particularly the language of the claim term "lifetime," which does not require compliance or adoption of the NSF/ANSI 53 protocol in a manufacturer's or seller's "claim." Nor did Brita ever present evidence or argument that a person of ordinary skill in the art would interpret the "lifetime" claim term as mandating that manufacturers and sellers must implement the NSF/ANSI 53 protocol in their "claimed" filter usage lifetime, even if one were to accept Brita's premise that such a skilled artisan reading the claims in light of the specification might consult

the NSF/ANSI 53 protocol to understand the meaning of the "lifetime" limitation, especially because it was incorporated by reference.

Second, Brita has failed to establish that the 2007 version of NSF/ANSI 53 protocol, the evidence upon which Brita relies for its argument, is in fact the version of the NSF/ANSI 53 protocol to which the specification refers. This calls into question the relevance of the evidentiary basis for its argument, particularly in view of the priority dates that Brita claims for its invention. Brita's and the *Markman* Order's reliance on the 2007 version of the NSF/ANSI 53 protocol cannot be squared with the ID's finding that the earliest priority date to which the '141 patent is entitled predates the 2007 version of the protocol. The ID, at Brita's urging, found that "[t]he earliest priority date of the '141 patent is July 25, 2006, as evidenced by actual reduction to practice of the '141 patent claims" and that "[t]he '141 patent also is entitled to a priority date of September 19, 2006, which is the date of a memorandum that Dr. Knipmeyer created expressly articulating the FRAP factor." ID at 120. However, the later priority date of September 19, 2006, upon which Brita relies for the priority date for these claims, predates the NSF/ANSI 53 (2007) protocol. Brita, however, provides no explanation as to why the evidence it offered, *i.e.,* the 2007 version of the NSF/ANSI 53 protocol, must be the default methodology, when it has not been established that the 2007 version of the methodology was actually used to test the filters disclosed in the patent.[15] *See, e.g.*, '141 patent, Table 5.

Brita's evidentiary basis is further undermined because testing under the 2007 NSF/ANSI 53 protocol leaves an embodiment disclosed in the '141 patent that is outside the scope of the claim limitation. *See SynQor, Inc. v. Artesyn Techs., Inc.*, 709 F.3d 1365, 1378-79 (Fed. Cir.

[15] Brita also never argued that a person of ordinary skill in the art would employ the NSF/ANSI 53 protocol that was in place at the time the patent was filed.

2013) ("A claim construction that excludes the preferred embodiment is rarely, if ever, correct and would require highly persuasive evidentiary support."). Specifically, as Respondents point out, Table 5 of the '141 patent (depicted below) discloses an embodiment, PT3-6, with a lifetime of 40 gallons. Resp. R. Sub. at 3. Yet, this embodiment "could not have a lifetime of 40 gallons if validation were required based upon NSF 53 (2007) lead reduction testing because the c_e of 13.3 µg/L would exceed the 10.0 µg/L imposed by the standard." *Id.*; JXM-0003.094.

TABLE 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	58.6
PA3-8	40	4.4	89	7.5	45.7
PT3-4	40	4.2	89	6.3	38.7
PT3-6	40	4.6	89	13.3	78.5
PT3-4 alternate housing	40	4.6	89	1.3	16.6
PT3-11	40	4.4	89	8.5	51.2
PT3-13	40	4.2	89	9.2	52.7
PT3-51	40	5.7	89	3.8	36.2
PT3-53	40	5.1	89	2.3	24.2
P2-8 lead sorbent free	40	3.4	89	52.8	208.4
P2-6 lead sorbent free	40	2.3	89	87.1	223.1
Cylindrical Block:					
Block 1	40	17.0	151	9.2	357.7
Block 2	40	9.9	151	14.6	308.2
Mixed Media:					
Brita Granular	40	5.5	128	42.2	386.7
German Maxtra	40	4.9	145	43.8	402.3
Pur 2 stage w/timer	40	16.0	141	30.2	911.4
Pur 2 stage w/timer	40	10.4	141	36.6	706.8
Pur 2 stage w/timer	40	11.0	141	38.6	785.9

'141 patent, Table 5. That is, the PT3-6 embodiment would fail the "validated by NSF/ANSI 53 (2007) standard" construction inserted into the definition of "lifetime" by the *Markman* Order, but the scope of the claim must be broad enough to encompass that disclosed embodiment. *See*

SynQor, 709 F.3d at 1378-79. Thus, Brita's only evidence of the described methodology for determining "lifetime," the NSF/ANSI 53 (2007) protocol, does not adequately define the scope of the limitation. Accordingly, the Commission finds that the ALJ's reliance on the 2007 version of the NSF/ANSI 53 protocol is insufficient to delineate the metes and bounds of the claim.

Third, Brita's argument that the NSF/ANSI 53 protocol referenced in the specification overcomes indefiniteness is contrary to black letter law because the specification recites no specific version of NSF/ANSI 53 protocol and that protocol is subject to change. While Brita presented only the 2007 version of the NSF/ANSI 53 protocol to support its construction, the '141 patent incorporates by reference the NSF/ANSI 53 protocol as a whole and does not incorporate a specific version. '141 patent at 26:22-29 ("FRAP performance testing may be conducted according to the NSF/ANSI 53 protocol . . . which is herein incorporated by reference."); ID at 15. Thus, even if the 2007 version of the protocol is not relevant, one could argue that the NSF/ANSI 53 protocol in general is clear enough to give meaning to the claim. The problem, however, is that since the protocol changes over time, the scope of the claimed "lifetime" will vary based upon the version of the NSF/ANSI 53 protocol that one relies upon. No other version of the NSF/ANSI 53 protocol has been introduced into the record by Brita to show a consistent methodology for determining "lifetime." Yet, under Federal Circuit law, the scope of a claim cannot evolve over time. *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1385 (Fed. Cir. 2014) ("We have long recognized that, although the understanding of a claim term can evolve over time, the literal scope of a patent claim cannot have different meanings at different times."); *see* "ANSI: NSF/ANSI 53-2021, Past Revisions of NSF 53," *available at* https://blog.ansi.org/nsf-ansi-53-2021-drinking-water-units-health-effect/#gref (last visited July 19, 2023)). This potential variation in methodology underscores why generally relying upon the

NSF/ANSI 53 protocol to determine lifetime is problematic. The specification broadly defines lifetime, consistent with the explicit claim language, in a manner that would encompass other undisclosed protocols or even unsupported assertions made by a manufacturer or seller. ’141 patent at 26:6-8.

Moreover, record evidence shows that the filter usage lifetime could also depend on what contaminant is being filtered or the quality of the source water. *See* RXM-0019 [Knipmeyer Rough] at 150-151, 261-265 (acknowledging that lifetime of the filter can change based on the contaminant being filtered). Indeed, the lifetime of the filter could be claimed based on other impurities being filtered such as, a certain number of gallons for arsenic, a certain number of gallons for chromium, a certain number of gallons for lead, etc. *See* RX-0020 (Harrison Decl.) at ¶ 42-44. The evidence further shows that manufacturers often use a single lifetime claim that is not related to the amount of lead that the filter can reduce but rather related to the “lowest common denominator” contaminant that a filter is effective in reducing. *Id.* at ¶ 44. That is, if a filter is certified for lead at 60 gallons but chlorine at 40 gallons, the reported lifetime is often just “40 gallons,” which fails to indicate the lead reductive qualities of the filter as required by the claim. The ’141 patent provides no guidance for one skilled in the art on how to measure the “Lifetime” limitation.

Brita further argues that “[s]ince consumers rely on lifetime numbers to determine the value proposition of a given water filter it is logical that the asserted lifetime of filters must be tested and validated so that they are not deceptive or misleading.” Brita Sub. at 7. Although this attorney argument may ring true, it is unsupported by record evidence and has no bearing on how the inventors described and claimed their invention in the intrinsic evidence of the patent.

In sum, Brita's arguments and evidence fail to cabin the lifetime "claimed by a manufacturer or seller" in a manner that can be understood by a skilled artisan with reasonable certainty by reason of the pure subjectivity by which a manufacturer or seller can claim a filter usage lifetime. The "L-filter usage lifetime claimed by a manufacturer or seller" could cover lifetimes that are claimed on packaging and in advertising and those that are claimed in other undisclosed places. The term could also cover claimed lifetimes that are calculated and substantiated using testing as well as those that are claimed with no apparent objective basis. It could include lifetimes that are verified using the 2007 version of the NSF/ANSI 53 protocol or a different version of that standard or using another protocol altogether. Lifetimes claimed by manufacturers and sellers could be untethered to any fact-based measure. Additionally, it could encompass different lifetimes claimed by different manufacturers or sellers of the same product and can be based on various contaminants not just lead. This undefined and variable scope does not inform persons skilled in the art about the scope of the invention with any certainty. Nor can the claims be saved by any of the intrinsic or extrinsic evidence on the record as discussed above. Thus, the evidence shows that an ordinarily skilled artisan at the time of the invention could not have ascertained the scope of the limitation "filter usage lifetime claimed by a manufacturer or seller of the filter" with reasonable certainty. Accordingly, the Commission finds that the claims 1, 2-6 and 23 of the '141 patent are invalid for indefiniteness.

C. Written Description

The Commission determined to review the ID's findings on written description. 88 Fed. Reg. 42951 (July 5, 2023). On review, the Commission has determined to reverse the ID's findings. Independent of the Commission's determination that the asserted claims are invalid as indefinite based on the inability to ascertain with reasonable certainty the lifetime limitation, the

Commission finds that claims 1, 2-6 and 23 of the '141 patent are invalid for lack of written description as to any filter media other than carbon block filters that are within the scope of the asserted claims and, as discussed below, for lack of enablement of the asserted claims relating to non-carbon block filters.

1. Legal Standard

The written description requirement of 35 U.S.C. § 112 states that:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

35 U.S.C. § 112 (Pre-AIA). A patent disclosure satisfies the written description requirement when it "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Novartis Pharms. Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1016 (Fed. Cir. 2022) (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citations omitted)). The written description analysis "requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art" and "[b]ased on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed." *Ariad*, 598 F.3d at 1351. As explained in *Ariad*, the analysis varies depending on context:

> [T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology. For generic claims, we have set forth a number of factors for evaluating the adequacy of the disclosure, including "the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science of technology, [and] the predictability of the aspect at issue."

Id.

The purpose of the "written description" requirement is to "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, the inventor was in possession of the invention." *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991). "The invention is, for purposes of the 'written description' inquiry, *whatever is now claimed*." *Vas-Cath*, 935 F.2d at 1563-64 (emphasis in original). *Id.* "The essence of the written description requirement is that a patent applicant, as part of the bargain with the public, must describe his or her invention so that the public will know what it is and that he or she has truly made the claimed invention." *Nuvo Pharms. (Ireland) Designated Activity Co. v. Dr. Reddy's Lab'ys Inc.*, 923 F.3d 1368, 1376-77 (Fed. Cir. 2019). The Federal Circuit has explained that "[t]he written description requirement exists to ensure that inventors do not attempt to preempt the future before it has arrived." *Billups-Rothenberg, Inc. v. Associated Reg'l & Univ. Pathologists, Inc.*, 642 F.3d 1031, 1036 (Fed. Cir. 2011).

A patent is presumed to have adequate written description. *Novartis*, 38 F.4th at 1019. The presumption of validity must be overcome by clear and convincing evidence. *Ariad*, 598 F.3d at 1354-55. Compliance with the written description requirement is a question of fact. *Id*.

2. The ID

The ID noted Respondents' argument that the written description requirement is not met because the disclosure does not describe the full claim scope of filter media types that could fall within the broadly recited "filter media." ID at 173.[16] Specifically, Respondents argued that the '141 patent fails to show that the inventors had possession of filter species other than carbon

[16] The Commission takes no position on the ID's discussion and findings on Respondents' second argument, *i.e.*, whether there is adequate written description for the ranges of values of the FRAP factor and its variables recited in the asserted claims.

block filters. *Id.* The ID noted Brita's counter argument that there is adequate disclosure in the specification and originally filed claims to support the asserted claims. *Id.*

The ID agreed with Brita, stating that "Respondents lacked credible support for any dispute that explicit disclosures of the claims, or the invention claimed does not exist." *Id.* at 174-75. The ID further found that the "findings of fact stem from Brita's more accurate and complete explanations of the explicit, detailed factual explanation for the written description of the invention that is reflected in the specification, and on the more thorough and credible explanations and opinions that Brita's expert, Dr. Benny Freeman offered during the Hearing." *Id.* at 175-77. In contrast, the ID concluded with respect to Respondents' expert that "Dr. Hatch's initial 'opinion' was both legally and factually erroneous" and "was not credible." *Id.* at 182-84.

Respondents argued to the ALJ that "the '141 patent does not show that the inventors had possession of a filter species other than the carbon block filters" and that "the '141 patent is directed to a genus of at least eight distinct types of filter media, but the specification only possessed a limited number of carbon block water filters." *Id.* at 187. In response, the ID pointed to Brita's argument "that the specification discloses numerous filters, accompanied by examples of flow rate, volume, lifetime, effluent lead concentration, and FRAP factors that embody the claimed invention." *Id.* at 188. The ID noted that, "[a]s explained in *Ariad*, one way to define species falling within a genus is by name" and that "[h]ere, the specification of the '141 patent identifies by name the species such as mixed media, carbon blocks, nonwovens, hollow fibers, membranes, nonwovens, depth media, nanoparticles and nanofibers, and ligands, in at least two (2) locations: at column 25, lines 9-12, and column 26, lines 30-37. (JX-0022 at 25:9-12, 26:30-37)." *Id.* at 189. The ID concluded that "a skilled artisan would be able to 'visualize

or recognize' the members of the genus because the specification clearly identifies the species." *Id.*

Regarding Respondents' argument that "the only working examples in the '141 patent (see Tables 1 and 5 of the '141 patent) are for carbon block filters," the ID stated that "[i]n rebuttal Brita argued correctly legally that the written description requirement does not require working examples of each species." *Id.* at 190 (citing *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003)). The ID reasoned that "[i]n *Cordis*, a description of a preferred embodiment of certain types of openings was sufficient written description of broadly claimed openings" and that "the holding in *Cordis* supports a factual finding that while the '141 patent describes a preferred embodiment of carbon block, the other broadly claimed filters, identified below and in the '141 patent, have adequate written description in the specification." *Id.* at 190-91 (citing *Cordis*, 339 F.3d at 1364-65; JX-0022 at 11:35-41 (describing carbon block water filters), Table 5 (working examples of carbon block filters)).

The ID noted that "Brita argued that carbon block filters are not different in form and function than other filter media types because they function in the same manner across filter media types" and that "the field had been so well-studied by the time of invention that a skilled artisan would understand that filtration concepts were applicable across filter formats and applications." *Id.* at 196 (citing Tr. (Freeman) at 1513:16-1514:9; Tr. (Knipmeyer) at 174:4-13, 175:8-24 (describing similarities in chemical filtration and mechanical filtration for mixed media and carbon block filter media, wherein they both have "chemical filtration where they can absorb ion exchange and mechanical filtration or physical filtration. Really the difference is in the size of the particle that is used. So granular media tends to be larger sizes. Carbon block tends to be smaller sized particles"); CX-0143C.0072 (listing testing results mixed media filters with over

10 ppm effluent lead concentration - the "current" Brita legacy, Maxtra and PUR filters); Tr. (Knipmeyer) at 168:5-171:22 (explaining testing results shown on CX-0143C.0072)). According to the ID, one of the inventors, "Dr. Knipmeyer explained that the activated carbon may have different sizes in different filter media of carbon block compared to mixed media, but the filter media both perform chemical and mechanical filtration" and that "Dr. Freeman testified that the 'activated carbon and lead scavengers don't know or care what filter format they're in" but "perform their function independent of how they're organized and what their geometry is." *Id.* at 197 (citing Tr. (Freeman) at 1513:24-1514:2, 1518:3-8).

The ID concluded that "the weight of the evidence supports a finding of fact that the existing knowledge in the field at the time of the invention that became the '141 patent fails to support Respondents' argument that the various filter types are 'entirely' different in form and function." *Id.*

3. Analysis

The Commission finds that the ID erred in concluding that the asserted claims are not invalid for lack of written description. The '141 patent broadly claims any and all filtration media types with activated carbon and a lead scavenger that meet the functional FRAP factor limitation. *See, e.g.*, '141 patent claim 1, Resp. Pet. at 6. For instance, independent claim 1 recites: A gravity-fed water filter, comprising: "a filter media including at least activated carbon and a lead scavenger, wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less" according to a specific formula. While the claim is broadly directed to a filter that has activated carbon and a lead scavenger, it covers any type of filter media that incorporates those two things. The patent identifies several filter media types that could be used with activated carbon and a lead scavenger, including mixed media, carbon blocks, nonwovens, hollow fibers, membranes, depth media, nanoparticles and nanofibers, and ligands. '141 patent

at 25:9-12, 26:30-37. Yet, the patent discloses only a single filtration media species—carbon block—that achieved the claimed FRAP factor of less than 350, specifically disclosing "a gravity-fed carbon block water filter." '141 patent Abs., 1:15-18, 5:24-33, 6:11-23, 7:45-9:26; Tr. (Freeman) at 1569:5-1571:12; Tr. (Hatch) at 1428:2-1430:21. Indeed, in the "field of the invention" section, the patent states that "[t]he present invention relates to gravity flow filtration systems, and more particularly, this invention relates to carbon block and granular filters having rapid flow rates and excellent filtration performance." '141 patent 1:15-18. For the other types of filter media, the patent provides no guidance or information about how or why these other types of media achieve the requisite FRAP. '141 patent, 26:63-67; Tr. (Freeman) at 1569:5-1571:12; Tr. (Hatch) at 1428:2-1430:21. The breadth of the claim contrasted with the lack of disclosure tends to indicate that the inventors were not, in fact, in possession of the invention relating to the other types of filter media, besides carbon block, as of the filing date.

Brita concedes that "[t]here is no dispute that the inventors' reductions to practice were all carbon block filters." Brita Rep. at 15. Brita, however, argues that "the law has never required an actual reduction to practice to demonstrate possession, much less an actual reduction to practice *of all embodiments of the claims.*" *Id.* (citing *Ariad,* 598 F.3d at 1352) (emphasis by Brita). The ID too pointed to Brita's argument "that the specification discloses numerous filters, accompanied by examples of flow rate, volume, lifetime, effluent lead concentration, and FRAP factors that embody the claimed invention" and that "[a]s explained in *Ariad*, one way to define species falling within a genus is by name." *Id.* at 188. The ID stated that "[h]ere, the specification of the '141 patent identifies by name the species such as mixed media, carbon blocks, nonwovens, hollow fibers, membranes, nonwovens, depth media, nanoparticles and nanofibers, and ligands, in at least two (2) locations: at column 25, lines 9-12, and column 26,

lines 30-37 (JX-0022 at 25:9-12, 26:30-37)." *Id.* at 189. The ID concluded that "a skilled artisan would be able to 'visualize or recognize' the members of the genus because the specification clearly identifies the species." *Id.*

The Commission finds that there is clear and convincing evidence that the written description requirement is not met. The specification discloses that "[t]he formulation of gravity fed carbon blocks disclosed are unique in there [sic] ability to meet the required FRAP factor" and only provides examples of "gravity flow carbon blocks that have a FRAP factor of less than 350." '141 patent, 26:63-67. By their own admission in the patent, the inventors were only in possession of a filter that uses carbon blocks, not other types of filter media.

Similarly, the patent disclosure does not describe how any other types of filter media (other than carbon blocks) can achieve the claimed FRAP factor and specifically states that no other filter media types that were tested or known to exist in the market could achieve the claimed FRAP factor:

> Several gravity fed carbon blocks and mixed media filters have been tested for flow rate and lead reduction capability against the defined lead challenge water. Filters tested include several formulations of carbon blocks along with commercially available mixed media filters produced by BRITA® and PUR®. Based on the results from testing, the FRAP factors were calculated for each filter and reported below. ***No mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead.*** The formulations of gravity fed carbon blocks disclosed are unique in [their] ability to meet the required FRAP factor. The "Examples" below include many examples of gravity flow carbon blocks that have a FRAP factor of less than 350. ***It is not believed that any currently-marketed gravity-flow filters have a FRAP factor of less than 350.***

'141 patent at 26:55–27:2, Table 5 (emphasis added). Based upon this disclosure, one of ordinary skill at the time of the invention would not have understood that the inventors were in possession of other types of media filters (other than carbon block filters) that achieve a FRAP factor below 350.

Brita and the ID appear to suggest that the claims' recitation of "activated carbon" and a "lead scavenger" sufficiently provides commonality among all filter media types and that "activated carbon and lead scavengers don't know or care what filter format they're in" and will "perform [predictably] their function independent of how they're organized and what their geometry is." Resp. Sub. at 15-16 (citing Tr. (Freeman) at 1513:24–1514:2); ID at 175-79. While activated carbon and lead scavengers may perform as predicted when applied to water to remove lead and other impurities from it, that is not the point. The point is the ability to filter water with activated carbon, a lead scavenger, and a filter media that together achieve the specific FRAP factor disclosed and claimed in the patent. Yet, the specification does not describe how that combination can be used to achieve the required FRAP factor with a filter media other than carbon block so as to support the conclusion that the inventors were in possession of such invention using filter media other than carbon block. And, as Respondents note, "[n]othing suggests that the mere inclusion of activated carbon and a lead scavenger will, on its own, sufficiently reduce lead to levels such that the filter will necessarily achieve FRAP below 350." Resp. Sub. at 16.[17] Put differently, nothing in the patent disclosure would lead one of ordinary skill in the art to understand how the claimed FRAP could be achieved with filter media other than carbon blocks based solely on the predictability of activated carbon and lead scavengers as Brita and the ID appear to suggest.

Indeed, the clear and convincing evidence, including the patent disclosure itself and the inventors' testimonies, is to the contrary. As Respondents correctly point out, the patent "disclosure focuses the inventors' purported advancement to carbon block specific filters that

[17] As discussed below with regard to enablement (specifically *Wands* Factor 7), the evidence of record shows that the art is unpredictable with regard to achieving a FRAP factor below 350. *See, infra,* at 56.

have the performance capability to meet the functional FRAP limitation." Resp. Pet. at 8 (citing '141 patent Abs., 1:15-18, 5:24-33, 6:11-23, 7:45-9:26); Tr. (Freeman) at 1569:5-1571:12; Tr. (Hatch) at 1428:2-1430:21). The testimony of the inventors confirms that the invention disclosed in the specification is limited to carbon block filters. Specifically, the inventors themselves testified that they did not actually invent any non-carbon block filters that would meet the FRAP factor limitation. Resp. Pet. at 17-18 (citing Tr. (Knipmeyer) at 202:9-17 (invention utilized only carbon block); 203:5-9 (did not invent membrane filter); 203:10-14 (did not invent nonwoven filter); 203:15-19 (did not invent depth media filters); 203:20-24 (did not invent nanoparticle filter); 203:25-204:2 (did not invent nanofiber filter); 204:3-8 (did not invent granular media filter); 204:9-12 (did not invent or disclose granular activated carbon with ion exchange resin meeting FRAP limitation); RX-2607C Brita (Knipmeyer) 64:6-10 ("Q And – and as part of inventing this patented technology, did you invent any activated carbon and ion exchange resin filter that would have met this FRAP limitation? A Not at that time, no."); RX-2607C Brita (Knipmeyer) Dep. at 52:7-15 ("Q. What – what's the delta? What's the magic formula? . . . A. -- we changed technology from a granular media to a carbon block. Q. Did the current granular media solutions at the time, were they able to solve this problem? A. Not that I'm aware of.); RX-2607C at 327:15-328:6; RX-2601C (Reid) Dep. at 42:4-10; RX-2602C Omnipure (Saaski) Dep. at 114:17-116:2; RX-2602C Omnipure (Saaski) Dep. at 115:9-116:2.

Against this undisputed evidence, the Commission disagrees that "a skilled artisan would be able to 'visualize or recognize' the members of the genus because the specification clearly identifies the species." *See* ID at 189. As the Federal Circuit has explained, "[t]he written description requirement exists to ensure that inventors do not attempt to preempt the future before it has arrived." *Billups-Rothenberg*, 642 F.3d at 1036. We agree with Respondents that

"the disclosure of the '141 patent is not commensurate with this immensely broad scope" and that "[i]n concluding that the '141 patent properly demonstrates possession to the entire scope of Brita's claimed genus 'invention,' the ID permits Brita's claims to 'overreach the scope of the inventor's contribution to the field of art as described in the patent specification,' and undermine 'the *quid pro quo* of the patent grant.'" Resp. Pet. at 8 (citing *Ariad*, 598 F.3d at 1354-55).

Nor is it sufficient to simply recite in the specification the names of filter types to satisfy the written description requirement as the ID did here. ID at 189. The patent states that "[t]he nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed-media, carbon blocks, non wovens, hollow fibers and other filtration formats." It also states that "[t]he FRAP factor criteria set forth herein is applicable to all embodiments of pour through filters including but not limited to mixed media (carbon and ion exchange resin), carbon blocks with any type and size of carbon and binder material with and without lead sorbent" and that "[o]ther embodiments of the present invention include alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." '141 patent at 25:9-12, 26:30-37. These two statements enumerating other filter types, however, provide no guidance on how to achieve the claimed FRAP using filter media other than carbon blocks. *See Idenix Pharms. LLC v. Gilead Scis. Inc.*, 941 F.3d 1149, 1164 (Fed. Cir. 2019) (holding that the mere listing or examples of supposedly effective species fails to satisfy written description where the specification does "not explain what makes them effective, or why" and "depriv[ing] [an ordinarily skilled artisan] of any meaningful guidance into what compounds beyond the examples and formulas, if any, would provide the same result"). Further, use of the term "etc.," '141 patent at 26:37, indicates a genus broader than that which is specifically enumerated.

The ID's findings are based in part on its credibility determinations. However, the findings relied upon by the ID in this investigation, including Complainants' expert testimony, cannot overcome the express disclosures in the patent and the undisputed record evidence that clearly and convincingly show that the invention provides adequate written description support only for what the inventors actually invented: carbon block filters that meet the FRAP factor limitation, and not for the full breadth of the claims that, as written, cover any filter media that can achieve the FRAP factor limitation. *Nuvo Pharms. (Ireland) Designated Activity Co. v. Dr. Reddy's Lab'ys Inc.*, 923 F.3d 1368, 1381 (Fed. Cir. 2019) (finding claim indefinite where specification "does not demonstrate that the inventor possessed more than a mere wish or hope that uncoated PPI would work, and thus it does not demonstrate that he actually invented what he claimed: an amount of uncoated PPI that is effective to raise the gastric pH to at least 3.5"); *see also id.* ("Although inventor testimony cannot establish written description support where none exists in the four corners of the specification, it illuminates the absence of critical description in this case.").

In sum, the ID's finding that the patent disclosure provides adequate written support for non-carbon block filter media is not supported by the undisputed record evidence. Thus, the Commission has determined to reverse the ID on that issue and find the asserted claims invalid for lack of written description under 35 U.S.C § 112.

D. Enablement

The Commission determined to review the ID's findings on enablement. 88 Fed. Reg. 42951-52 (July 5, 2023). On review, the Commission has determined to reverse the ID's findings. The Commission finds that Respondents have established by clear and convincing

evidence that the full scope and types of filter media of claims 1, 2-6 and 23 of the '141 patent are not enabled.

1. Legal Standard

The enablement requirement of 35 U.S.C. § 112 states that:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the same.

35 U.S.C. § 112 (Pre-AIA). The Supreme Court has explained that "[i]f a patent claims an entire class of processes, machines, manufactures, or compositions of matter, the patent's specification must enable a person skilled in the art to make and use the entire class" and that "the specification must enable the full scope of the invention as defined by its claims." *Amgen Inc. v. Sanofi*, 143 S. Ct. 1243, 1254 (2023). The standard for enablement is whether a person skilled in the art can "make and use" the invention "without undue experimentation." *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988) (finding enablement where the disclosure provided considerable direction and guidance, working examples, in combination with a high level of skill and that methods to practice the invention were well-known). "The 'undue experimentation' proscription is, in effect, a gloss on the statute which has arisen from decisional law which requires that sufficient information be given in the application so that one of ordinary skill in the art can practice it without the necessity for undue experimentation." *Fields v. Conover*, 443 F.2d 1386 (CCPA 1971). "Sufficiently routine" experimentation that would be reasonable for a skilled artisan to carry out does not preclude a finding of enablement. *Amgen Inc. v. Sanofi, Aventisub LLC*, 987 F.3d 1080, 1085 (Fed. Cir. 2021). However, a finding of "undue" experimentation to make and use the invention leads to lack of enablement. *Id.* Factual considerations, now known as the *Wands* factors, guide the inquiry as to whether a person skilled

in the art would require "undue" experimentation to make and use the invention. *Id.* at 1084. "Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Wands*, 858 F.2d at 737. The *Wands f*actors are:

> (1) the quantity of experimentation necessary,
> (2) the amount of direction or guidance presented,
> (3) the presence or absence of working examples,
> (4) the nature of the invention,
> (5) the state of the prior art,
> (6) the relative skill of those in the art,
> (7) the predictability or unpredictability of the art, and
> (8) the breadth of the claims.

Id.

The *Wands* factors "are illustrative, not mandatory," and there is no requirement to consider all of the factors. *McRO, Inc. v. Bandai* Namco *Games Am. Inc.*, 959 F.3d 1091, 1100 (Fed. Cir. 2020) ("*McRO II*"). A *Wands* analysis considers "how much experimentation a skilled artisan would have to undertake to make and use those products or processes." *Id.* A lack of enablement requires "identif[ying] specifics that are or may be within the claim but are not enabled." *Id*. at 1104. Under Federal Circuit precedent, the specification need not "describe how to make and use every possible variant of the claimed invention." *Amgen*, 987 F.3d at 1084-85 (quoting *McRO II*, 959 F.3d at 1100). However, as the Supreme Court explained, "in allowing that much tolerance, courts cannot detract from the basic statutory requirement that a patent's specification describe the invention 'in such full, clear, concise, and exact terms as to enable any person skilled in the art' to 'make and use' the invention. *Amgen*, 143 S. Ct. at 1255. As the Court put it, "[t]he more one claims, the more one must enable." *Id.*

"Enablement is determined from the viewpoint of persons of skill in the field of the invention at the time the patent application was filed." *Ajinomoto Co., Inc. v. Archer-Daniels-*

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Midland Co., 228 F.3d 1338, 1345 (Fed. Cir. 2000). Enablement, unlike written description, is a question of law. *Ariad*, 595 F.3d at 1351.

2. The ID

The ID found that "an analysis of the relevant *Wands* factors and the evidence the Parties offered fails to support a finding of fact or law that undue experimentation is required to reach the full scope of the FRAP factor, its variables, and filter media types in the asserted claims." ID at 209. Thus, the ID concluded that "Respondents have failed to prove by clear and convincing evidence that the claims, including the full scope of the FRAP factors and types of filter media, are not enabled."[18] *Id.*

Wands Factor 1 – Quantity of Experimentation

The ID found that "Respondents broadly addressed *Wands* factors 1 and 8, but ultimately the opinion of their expert, Dr. Hatch, on *Wands* factor 1 was conclusory." *Id.* (citing Tr. (Hatch) at 1432:13-1435:5 (FRAP factor values); 1438:14-1439:13 (filter media embodiments)). The ID stated that "[e]xperimentation may be 'considerable,' yet not rise to experimentation consistent with non-enablement, so long as it is 'merely routine' or the specification 'provides a reasonable amount of guidance.'" ID at 209-210 (citing *Wyeth & Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380, 1386 (Fed. Cir. 2013); *Cephalon, Inc. v. Watson Pharms., Inc.*, 707 F.3d 1330, 1338 (Fed. Cir. 2013) ("Extensive experimentation does not necessarily render the experiments unduly extensive where the experiments involve repetition of known or commonly used techniques.")). Regarding the "broad functional ranges of the asserted claims," the ID noted that "Respondents did not directly brief the quantity of experimentation that a person of skill might

[18] The Commission takes no position on the ID's discussion and findings regarding Respondents' argument that the "broad functional ranges of the asserted claims are not enabled," *id.* at 208.

require, *Wands* factor 1, in its Pre-Hearing Brief or Post-Hearing briefing" but rather "argued that there was undue experimentation based on *Wands* factors 2-6 and 8." *Id.* at 210 (citing (Tr. (Hatch) at 1432:13-1435:5 (FRAP factor values), 1438:14-1439:13 (filter media embodiments)). The ID stated that "[b]ecause there is no substantiation for Dr. Hatch's testimony and Respondents' argument, Respondents have abandoned, withdrawn and/or waived any argument on this issue under Ground Rules 7.2 and 10.1." *Id.* at 211. The ID added that "[a]t best, Dr. Hatch's testimony was conclusory; it was given little weight or credibility." *Id.*

As to whether "there would be undue experimentation to make and use filters other than carbon block," the ID found that Respondents' expert, "Dr. Hatch did not provide explicitly supported evidence with his opinion on either the quantity of experimentation necessary to have arrived at carbon block filters or any of the filter media that the '141 patent discloses" and failed to "explain what undue experimentation is." *Id.* at 213 (citing Tr. (Hatch) at 1439:9-1440:21). The ID found that "[i]n contrast, Dr. Freeman provided testimony about the level of experimentation needed to translate the teachings of a carbon block filter to, for example, a nonwoven filter" and testified that "a person of skill would know: (a) the filter volume; (b) lead scavenger component; (c) activated carbon component; (d) 'how closely compressed the activated carbon and lead scavenger had been with their -- with the binder,' and together those 'would give an idea of the pore size that was available for filtration.'" *Id.* at 213 (citing (Tr. (Freeman) at 1521:8-12-1522:1) (pointing to Dr. Freeman's testimony that "because the components and raw materials that go into the filter are going to ***perform their function in any filter media*** that they're put into" that "***after some experimentation***, but not undue experimentation," comparable performance would be achieved") (emphasis in ID).

The ID found that "Respondents had the burden of proof to show that the quantity of experimentation favors a finding of undue experimentation" but that "Brita had the better supported argument, and credible opinion, through Dr. Freeman's testimony." *Id.* at 216.

Wands Factor 2 – The Amount of Direction or Guidance Presented

The ID noted Respondents' argument that "the '141 patent discloses only one type of working example, carbon block filters" and that "Respondents indirectly suggested that the working examples of carbon block in the '141 patent are not a source of guidance for the remaining filter blocks or full range of FRAP factor values." *Id.* at 216-17. The ID found that "Dr. Freeman testified that there is guidance or direction in the '141 patent to make filter media other than carbon media." *Id.* at 223-24. The ID stated that "Dr. Freeman testified that 'additional guidance throughout the specification [that] provides information to a person of skill in the art about how to -- how to extend and expand on the working examples ***to other media*** and to other examples with different characteristics and different materials.'" *Id.* (citing Tr. (Freeman) at 1520:22-1521:4 (emphasis by ID); JX-0022 at 13:30-34 (describing carbon block and granular filters), 26:30-37 (describing filter media embodiments of mixed media, carbon block, membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands)).

According to the ID, "Dr. Freeman explained that the working examples provide guidance, based on a skilled artisan's understanding of pore size and components of the filter, to make and use filters with other filter media." *Id.* (citing Tr. (Freeman) at 1521:13-18, 1522:21-24). The ID found that "Dr. Freeman provided some reasoning, that the working examples of carbon block are guidance to make and use filters comprising other filter media." *Id.* at 224. The ID stated that "[g]iven that the testimonies are conflicting, and given that Respondents had

the burden of proof, when Dr. Freeman's explicit reference to and discussion of Figures 21-23 is examined, Brita and its expert have the better supported argument." *Id.*

<u>*Wands* Factor 3 – Working Examples</u>

The ID noted Respondents' argument "that there were no working examples of 'granular carbon filters, pleated paper filters or alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc.' to achieve the claimed FRAP factors in the '141 patent." *Id.* at 225. The ID noted Brita's argument that "a skilled artisan could take the carbon block working examples, in light of knowledge in a well-known field, to construct and configure filters with alternative filter media" and that "Dr. Hatch did not disagree that these filters, filter media or configurations to obtain certain desired benefits are well-known." *Id.* (citing Tr. (Hatch) 1461:16-23 (admitting gravity-fed filters are well-known), 1465:7-1466:12) (describing well-known gravity-fed water filters of nonwovens, depth media, nanofibers, ligands, zeolites), 1466:13-17, 1467:6-9 (configuring different filter media by a skilled artisan)). The ID found that "Dr. Freeman admitted that there are no working examples of filter media other than carbon block" but that "Dr. Freeman testified that a 'routine' effort would extend the teaching of the '141 patent to other filter media types." *Id.* at 227 (citing (Tr. (Freeman) at 1561:16-19 ("My opinion is that the '141 patent disclosed carbon blocks in the working -- in the working examples, and then in the specification it also discloses other filter media"); Tr. (Freeman) at 1562:4-17).

The ID found that "Brita was unable to rebut that the '141 patent has no working examples for filter media other than carbon block" but that "this is not a case where the specification provides no enabling disclosure." *Id.* at 228 (citing *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997)). The ID stated that "[t]he evidence shows

that there is a presence of working examples for carbon block and granular carbon in the ’141 patent, but [an] absence of working examples for filter media other than carbon block” and that “Respondents had the better supported argument.” *Id.* at 228-229. The ID stated that “*Wands* factor 3 favors a finding of fact and law that there would be undue experimentation to make the claimed invention.” *Id.* at 229.

Wands Factor 4 – The Nature of the Invention

The ID found that “Dr. Hatch testified that carbon block filters were ‘the only nature of the invention that’s shown’ in the ’141 patent” and that “Dr. Freeman testified that ‘the nature of the invention is gravity-fed water filters, and we’ve heard several times today that this is a well-known field and has been known for many decades if not longer.’” *Id.* at 229 (citing Tr. (Hatch) 1438:20-23; Tr. (Freeman) at 1519:21-24). The ID stated that “[i]t is a factual finding that the nature of the invention is gravity-fed water filters including, according to one embodiment, carbon block filter media” and that “[t]he evidence does not clearly show that the nature of the invention either supports or does not support a finding of undue experimentation.” *Id.* According to the ID, “[g]iven that Respondents had the burden of proof, *Wands* factor 4 does not support a finding of undue experimentation.” *Id.*

Wands Factor 5 – The State of the Prior Art

The ID observed that “Respondents argued *Wands* factors 5 and 6 together,” contending that “the state of the prior art and relative skill of those in the art supports undue experimentation to reach the full scope of the claimed invention.” *Id.* at 230. The ID found that “the evidence supports a finding that the state of the art was advanced, which does not favor a finding under *Wands* factor 5 that there would be undue experimentation to make the claimed invention.” *Id.*

at 235 (citing Tr. (Freeman) at 1586:13-1589:10; Tr. (Hatch) at 1461:14-1462:21, 1464:20-1465:5, 1465:18-1468:15).

Wands Factor 6 – The Relative Skill of Those in the Art

The ID found that "Respondents failed to provide substantiated arguments about the skill of those in the art" and that "Dr. Hatch did not offer an opinion on this individual *Wands* factor." *Id.* at 236. The ID, however, found that Dr. Hatch "acknowledged that a person of skill in the art would know how to calculate the FRAP factor variables of volume **V**, average filtration unit time **f**, effluent lead concentration $\mathbf{c_e}$, and lifetime **L** if properly defined." *Id.* (citing Tr. (Hatch) at 1434:18-1435:20).

Wands Factor 7 – The Predictability of the Art

The ID stated that "Respondents failed to argue about predictability in their Pre-Hearing Brief" and has therefore "abandoned, waived or withdrawn any argument on this issue under Ground Rule 7.2." *Id.* at 236-37.

Wands Factor 8 – The Breadth of the Claims

The ID noted Respondents' argument that "the broad range of filter types is not enabled because the specification only discloses carbon block filters, disparages mixed media filters, would use trial and error, and requires gap-filling at the novel point of invention." *Id.* at 237. Respondents also argued that "the '141 patent claims functional ranges of FRAP factor values, volume and average filtration unit time values that are broad and unbound are not enabled." *Id.* The ID also noted Brita's response that "a specification need not explain every detail, and typically omits what is well-known." *Id.* The ID stated that "[u]nlike *Amgen* [987 F.3d 1080, 1085 (Fed. Cir. 2021)], the asserted claims do not claim a function but rather, claim a mathematical formula, inter-related variables, and provide a performance result of a particular

FRAP factor value" and that "[t]he FRAP factor itself embodies structure." *Id.* at 241. The ID surmised that thus "here, the bar for enablement is not as high as in *Amgen* because the FRAP factor is not pure functional claiming." *Id.* The ID noted that "Dr. Hatch opined that a person of ordinary skill in the art would not know how to achieve the very low end of FRAP values, *i.e.*, a FRAP factor below 6.7." *Id.* (citing Tr. (Hatch) at 1431:1-14). The ID noted that "Dr. Freeman disagreed and opined that a person of skill would know how activated carbon and lead scavenger influence the variables of the FRAP factor to meet the performance required in the asserted claims." *Id.* (citing Tr. (Freeman) at 1524:16-1525:1).

Respondents also argued that while there are numerous possible filter species and structure that could meet the structural limitations of the '141 patent, "the inventors had exactly one species of filter (carbon block), one size and kind of activated carbon, and two lead scavengers: a grand total of two working examples P-A and P-T." ID at 247 (citing JX-0022 at Tables 1, 5). The ID stated that "[i]t is not disputed that the '141 patent discloses various filter media embodiments, various activated carbon, and lead scavengers" and that "[t]hese are all in the prior art." *Id.* The ID pointed to Dr. Freeman's testimony that "while the activated carbon and lead scavenger may take different forms, they are all expected to behave in the same manner in the filter media." *Id.* The ID found that while "[t]he claims are broad in that the filter media is not limited to carbon block in the asserted claims," "it is not clear that this supports a finding of undue experimentation given the state of the art and the remaining *Wands* factors." *Id.* at 248.

The ID noted that "Respondents argued that Dr. Knipmeyer acknowledged that creating non-carbon block embodiments would involve creating new technology." *Id.* at 249 (citing RSBr. at 46 (citing (Tr. (Knipmeyer) at 327:15-328:6 ("I imagine that you could develop new technology that would -- that would meet that requirement" of the '141 patent.))). The ID

pointed to *Centrak*, and stated that there, "an inventor's admission of not having working examples of all embodiments was not fatal to meeting the written description requirement because the nature and context of the invention was also considered." *Id.* The ID found that "[h]ere, the remaining *Wands* factors, including that the state of the prior art recognizes that filter media other than carbon block were well-known, on balance, support enablement." *Id.*

3. Analysis

As with written description, the Commission finds that Respondents have shown by clear and convincing evidence that the asserted claims are invalid because they are not enabled. At the outset, we note that the Supreme Court's *Amgen* opinion neither affirmatively required nor disparaged a *Wands* analysis. In our view, a *Wands* analysis remains useful in determining whether a claimed invention meets the enablement requirement and we have considered each of the *Wands* factors.

<u>*Wands* Factor 1 - Quantity of Experimentation</u>

We disagree with the ID's findings as to *Wands* factor 1. Specifically, the Commission finds unpersuasive the ID's conclusion that there would not be undue experimentation to make and use filters other than carbon blocks. The ID largely relied on experts to find that the claims were enabled. ID at 213 (citing (Tr. (Freeman) at 1521:8-12-1522:1). However, there is no dispute that the patent disclosure itself provides no teaching on how any filter other than carbon blocks can achieve the required FRAP. Indeed, the patent specification states that the inventors tested "mixed media filters containing granular carbon [*i.e.*, activated carbon] and ion exchange resin [*i.e.*, a lead scavenger]" with other types of filter media, however, "[a]ll mixed media filters tested fail to adequately reduce total lead concentrations by 50% (75 liters) of filter life." '141 patent at 31:9–10; 31:54–55; '141 patent at 26:63-67; Tr. (Freeman) at 1569:5-1571:12; Tr. (Hatch) at 1428:2-1430:21. Despite these failures, the patent specification does not provide a

road map for how mixed media materials, or any type of filter other than carbon blocks, can achieve the required FRAP. Further to this point, as noted above, the inventors readily admit that they did not invent any filter with a material type other than carbon block in connection with the ’141 patent. *See* Tr. (Knipmeyer) at 202:9-17 (invention utilized only carbon block); 203:5-9 (did not invent membrane filter); 203:10-14 (did not invent nonwoven filter); 203:15-19 (did not invent depth media filters); 203:20-24 (did not invent nanoparticle filter); 203:25-204:2 (did not invent nanofiber filter); 204:3-8 (did not invent granular media filter); 204:9-12 (did not invent or disclose granular activated carbon and ion exchange resin combination meeting FRAP limitation); 204:13-17 (no disclosure in the ’141 patent of any filters other than carbon block).

As Respondents correctly observe, “[t]he only general quality common to every filter disclosed in the ’141 Patent capable of achieving FRAP of less than 350 is carbon block, which is a completely different type of filter than any other type referenced in passing in the ’141 Patent.” Resp. Sub at 16. The patent specification discloses that carbon block filters are made from powdered activated carbon that must be bonded with a binder and then formed into “an integrated, porous, composite, carbon block.” *Id.* (citing ’141 patent at 13:22-24; 9:44-10:40 (disclosing types of binders that can be used)). The patent discloses other media filters that use granular activated carbon (*i.e.*, loose granules held in a compartment with no binder) with an ion exchange resin, but none of these were shown to meet the required FRAP. ’141 patent at 3:25-4:24.

The ID suggested that figures 21-23 provide guidance on how to achieve the required FRAP without undue experimentation. ID at 224. Figures 21-23 are graphical representations of filter FRAP factors as a function of filtration unit time and Volume, lead reduction, and filter lifetime, respectively. JX-0022 at 26:38-40. The patent, after describing figures 21-23,

specifically states that "[s]everal gravity fed carbon blocks and mixed media filters have been tested for flow rate and lead reduction capability against the defined lead challenge water." *Id.* at 26:55-57. The patent specification then explains that the "[f]ilters tested include several formulations of carbon blocks along with commercially available mixed media filters produced by BRITA and PUR." *Id.* at 26:57-60. Based on the results from testing, "[n]o mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead." *Id.* at 26:61-63. Only the carbon block formulations met the claimed FRAP. The patent specification makes clear that "[t]he formulations of gravity fed *carbon blocks* disclosed are unique in [their] ability to meet the required FRAP factor." *Id.* at 26:63-65 (emphasis added). The patent then goes on to provide "many examples of gravity flow *carbon blocks* that have a FRAP factor of less than 350" and states that "it is not believed that any currently-marketed gravity-flow filters have a FRAP factor of less than 350." *Id.* at 26:67-27:2 (emphasis added). There is nothing in this disclosure that would guide a skilled artisan to develop a non-carbon block filter that achieves the required FRAP. Indeed, given the failed efforts of the inventors to create a non-carbon block filter as discussed above, this disclosure in the patent itself would discourage an ordinarily skilled artisan from pursuing the use of non-carbon block filters. The ID's finding is therefore contradicted by the patent disclosure itself.

Wands Factor 2 – The Amount of Direction or Guidance Presented

Regarding *Wands* factor 2, the ID found that "Dr. Freeman testified that there is guidance or direction in the '141 patent to make filter media other than carbon media." ID at 223-24. The Commission disagrees. The only "guidance" provided in the patent is the unremarkable listing of the names of several types of non-carbon block filter media. '141 patent at 26:30-37 (listing filter media embodiments of mixed media, carbon block, membranes, nonwovens, depth media,

nanoparticles and nanofibers, ligands). There is, however, no dispute that the patent does not teach how any of these media can achieve the claimed FRAP factor. Tr. (Freeman) at 1569:5-1571:12; Tr. (Hatch) at 1428:2-1430:21.

Moreover, as Respondents assert, "[e]ven Dr. Knipmeyer [one of the inventors of the 141 patent] admits that creating non-carbon block embodiments would involve creating 'new technology, which speaks to the abject lack of enablement of the breadth of the claims." Resp. Rep. at 37 (citing RX-2607C Brita (Knipmeyer) Dep. at 327:15-328:6). Brita's response to this is that "Dr. Knipmeyer was simply explaining that she herself had not created the other filter types." Brita Rep. at 34 (citing ID at 249). But this proves the point that the patent does not provide guidance as to how other filter media can achieve the claimed FRAP; nor could it given the inventors indisputably had not attained any other filter material that achieved the claimed FRAP. Rather, all of their attempts were unsuccessful. In sum, we agree with Respondents that there is nothing in the '141 patent that would guide a person of ordinary skill in the art to make a non-carbon block filter capable of the FRAP performance capabilities of the claimed invention. *See* Resp. Rep. at 37.

<u>*Wands* Factor 3 – Working Examples</u>

Regarding *Wands* factor 3, because the '141 patent describes no working examples of the disclosed "granular carbon filters, pleated paper filters or alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." to achieve the claimed FRAP, the Commission agrees with the ID that "*Wands* factor 3 favors a finding of fact and law that there would be undue experimentation to make the claimed invention." ID at 229.

PUBLIC VERSION

Wands Factor 4 – The Nature of the Invention

As to *Wands* factor 4, despite the invention being directed broadly to gravity-fed water filters that can achieve FRAP of less than 350, carbon block filters are the only filter media the patent explains can achieve the claimed FRAP. The ID stated that "[i]t is a factual finding that the nature of the invention is gravity-fed water filters including, according to one embodiment, carbon block filter media" and that "[t]he evidence does not clearly show that the nature of the invention either supports or does not support a finding of undue experimentation." ID at 229. The ID then concluded that "[g]iven that Respondents had the burden of proof, *Wands* factor 4 does not support a finding of undue experimentation." *Id.*

The Commission finds that the nature of the invention is not gravity-fed water filters generally, but gravity-fed water filters that achieve the claimed FRAP with any type of filter media, and given that the patent discloses only carbon blocks to have achieved this FRAP, *Wands* factor 4 supports a finding of non-enablement. *See In re Colianni*, 561 F.2d 220 (CCPA 1977) ("The application of 'sufficient' ultrasonic energy is essential to appellant's claimed method, yet his specification does not disclose what a 'sufficient' dosage of ultrasonic energy might be or how those skilled in the art might make the appropriate selection of frequency, intensity, and duration." *** "The degree of disclosure and the nature of the art in this case are generally parallel to those in *In re Gardner*, 427 F.2d 786 (CCPA 1970), in which we found the specification not to comply with 35 USC 112, first paragraph.")

Wands Factor 5 – The State of the Prior Art

As to *Wands* factor 5, the ID found that "the evidence supports a finding that the state of the art was advanced, which does not favor a finding under *Wands* factor 5 that there would be undue experimentation to make the claimed invention." ID at 235. However, as discussed

above, the Commission finds that there is no evidence that this alleged advanced state of the prior art shows that a skilled artisan could have used other filter media to achieve the claimed invention without undue experimentation, especially when the evidence shows that the inventors themselves did not, and could not have done so without creating new technology.

Wands Factor 6 – The Relative Skill of Those in the Art

Regarding *Wands* factor 6, the ID found that "Respondents failed to provide substantiated arguments about the skill of those in the art" and that "Dr. Hatch did not offer an opinion on this individual *Wands* factor." *Id.* at 236. The ID, however, found that Dr. Hatch "acknowledged that a person of skill in the art would know how to calculate the FRAP factor variables of volume **V**, average filtration unit time **f**, effluent lead concentration $\mathbf{c_e}$, and lifetime **L** if properly defined." *Id.* (citing Tr. (Hatch) at 1434:18-1435:20). The Commission finds that the record evidence, however, shows that while the individual variables, such as volume V, are well-known, the FRAP factor does not embody a well-known or predictable law of physics or natural correlation that could be applied by a person of ordinary skill in the art. In fact, the evidence shows that the variables are interrelated such that changing one variable will change other variables in a nonlinear and unpredictable manner. Tr. (Hatch) at 1437:12-18; ID at 263, n.88. The ID observed that "[f]or example, in practice, doubling one variable does not double the FRAP factor because other variables also change depending on the interrelationship of the water filter, activated carbon and lead scavenger." ID at 263, n.88 (citing Tr. (Knipmeyer) at 219:7-11). Indeed, Dr. Knipmeyer testified that an ordinarily skilled artisan could not change an

individual input to the FRAP equation and expect a corresponding FRAP factor change because all the inputs are interrelated:

> Q. Keeping all other variables in the FRAP equation other than flow rate, let's say equal, in order to go from a FRAP of 6 to 3, I would have to essentially double my flow rate; is that right?
> A. Yes, but you can't change an individual characteristic. They're all interrelated.
> Q. You have to create the filter and consider the performance holistically, correct?
> A. That is correct.
> Q. In other words, you can't just snap your fingers, change one variable, and know that you would achieve a FRAP half as much; is that right?
> A. That's correct, because they are not mathematical variables, they are characteristics of the filter.

Tr. (Knipmeyer) 218:20-219:311 (emphasis added). Yet, the patent fails to disclose a general feature or characteristic of the claimed "genus" of filters that would lead an ordinarily skilled artisan to achieve the required FRAP with media filters other than carbon blocks. *Amgen*, 143 S. Ct. at 1254 (stating that "it may suffice to give an example (or a few examples) ***if*** the specification also discloses 'some general quality. . . running through' the class that gives it 'a peculiar fitness for the particular purpose"). Thus, the Commission finds that this factor supports a finding of non-enablement.

Wands Factor 7 – The Predictability of the Art

Regarding *Wands* factor 7, Brita argues that "[t]he art disclosed which components to use, how the components perform, and the modeling for the basic scientific theories underpinning filters' performance" and that "[t]he amount of information available made the field predictable." Brita Sub. at 22 (citing Tr. 1519:21-1520:12 (Freeman); Tr. 1461:14-1462:1 (Hatch)). Brita states that "the general theories regarding filtration mechanisms and separation were well known and documented across filter media types" and that "skilled artisans knew that fluids could be filtered via physical separation, such as when water passes through the filter's

pores." Brita Sub. at 22 (citing Tr. 1493:21–1494:10 (Freeman); Tr. 174:4-13, 175:8-24 (Knipmeyer)).

However, the Commission finds nothing in the patent that indicates how the characteristics of the materials interact to achieve the required FRAP, and the patent itself shows significant variability in the FRAP that is achieved with filters having the same starting materials. *See, e.g.*, '141 patent, Table 5 (showing the exact same "Pur 2 stage w/ timer" filter achieving three different FRAP results: 670.9, 748.4, and 851.6). Furthermore, it is remarkable that Dr. Knipmeyer testified that creating non-carbon block embodiments would involve creating "new technology." Tr. (Knipmeyer) at 327:15-328:6 ("I imagine that you could develop new technology that would -- that would meet that requirement" of the '141 patent.). Yet, how to develop that new technology remains unclear and unpredictable from this patent disclosure. For the reasons discussed above as well as with regard to the other *Wands* factors, the evidence of record shows that the art is unpredictable.

<u>*Wands* Factor 8 – The Breadth of the Claims</u>

The ID stated that "[i]t is not disputed that the '141 patent discloses various filter media embodiments, various activated carbon, and lead scavengers" and that "[t]hese are all in the prior art." *Id.* The ID pointed to Dr. Freeman's testimony that "while the activated carbon and lead scavenger may take different forms, they are all expected to behave in the same manner in the filter media." *Id.* The ID found that "[t]he claims are broad in that the filter media is not limited to carbon block in the asserted claims" but that "it is not clear that this supports a finding of undue experimentation given the state of the art and the remaining *Wands* factors." ID at 248. The ID concluded that "[h]ere, the remaining *Wands* factors, including that the state of the prior

art recognizes that filter media other than carbon block were well-known, on balance, support enablement."

The Commission disagrees. *Amgen* makes clear that the more a party claims, the more it must enable regardless of how sophisticated the purported invention maybe. *Amgen*, 143 S. Ct. at 1256 ("For if our cases teach anything, it is that the more a party claims, the broader the monopoly it demands, the more it must enable. That holds true whether the case involves telegraphs devised in the 19th century, glues invented in the 20th, or antibody treatments developed in the 21st."). And, here, the claims are broad and do not limit the type of filter media.

<u>Conclusion for *Wands* Factors</u>

Upon considering all of the *Wands* factors, the Commission finds that the broad claims asserted here are not enabled by the patent specification. While the patent specification discloses the names of various filter media embodiments, it indisputably fails to disclose how these filter media, other than carbon blocks, can achieve the claimed FRAP. Brita argues that "[t]he art disclosed which components to use, how the components perform, and the modeling for the basic scientific theories underpinning filters' performance" and that "the general theories regarding filtration mechanisms and separation were well known and documented across filter media types" and that "skilled artisans knew that fluids could be filtered via physical separation, such as when water passes through the filter's pores." Brita Sub. at 22. The Commission finds that the inventors, however, failed to "identify a quality common to every functional embodiment" that would allow an ordinarily skilled artisan to develop the new technology needed to achieve the required FRAP using a non-carbon block filter. *Amgen*, 143 S. Ct. at 1256. Indeed, the only functional embodiment disclosed is carbon blocks. Thus, developing non-carbon block filters to

achieve the claimed FRAP would require "painstaking," or at least undue, experimentation to uncover the new technology. *See id.* ("Whether methods like a 'roadmap' . . . might suffice to enable other claims in other patents—perhaps because, as this Court suggested in *Incandescent Lamp,* the inventor identifies a quality common to every functional embodiment, *supra,* at 1254-1255—they do not here. They leave a scientist about where Sawyer and Man left Edison: forced to engage in "painstaking experimentation" to see what works.).

The facts here are reminiscent of *Incandescent Lamp*, where the Court found such similar disclosure insufficient to satisfy the enablement requirement, as the *Amgen* Court explained:

> "Sawyer and Man supposed they had discovered in carbonized paper the best material for an incandescent conductor." *Id.,* at 472, 16 S.Ct. 75. But "[i]nstead of confining themselves to carbonized paper, as they might properly have done, and in fact did in their third claim, they made a broad claim for every fibrous and textile material." *Ibid.* Even that broad claim "might" have been permissible, the Court allowed, if Sawyer and Man had disclosed "a quality common" to fibrous and textile substances that made them "peculiarly" adapted to incandescent lighting. *Ibid.* Had they done so, others would have known how to select among such materials to make an operable lamp. But the record showed that most fibrous and textile materials failed to work. Only through "painstaking experimentation" did Edison discover that bamboo "answered the required purpose." *Id.,* at 475-476, 16 S.Ct. 75. The Court summed up things this way: "[T]he fact that paper happens to belong to the fibrous kingdom did not invest [Sawyer and Man] with sovereignty over this entire kingdom." *Id.,* at 476, 16 S.Ct. 75.

Amgen, 143 S. Ct. at 1256 (citing *The Incandescent Lamp Patent*, 159 U.S. 465 (1895)). Here too, having only invented carbon block filters to achieve the claimed FRAP, Brita attempts to claim sovereignty over the entire filter kingdom, and the evidence of record shows that it would take "painstaking," *i.e.*, undue, experimentation to find other types of filter materials that meet the claim requirements. The claims at issue here must therefore meet the same fate.

In sum, the ID's finding that an ordinarily skilled artisan can practice the claimed invention using non-carbon block filter media without undue experimentation is not supported by

the undisputed record evidence. Thus, the Commission has determined to reverse the ID on that issue and find the asserted claims invalid for lack of enablement under 35 U.S.C § 112.

E. The ID's Patent Eligibility Findings Under 35 U.S.C § 101

The Commission determined to review the final ID's invalidity findings, including patent eligibility under 35 U.S.C. § 101. 87 Fed. Reg. 42950-53 (July 5, 2023). On review, the Commission has determined to take no position on the issue. *See Beloit*, 742 F.2d at 1423.

F. The ID's Finding that the Cited Prior Art Do Not Anticipate the Asserted Claims Under 35 U.S.C § 102

The Commission determined to review the final ID's invalidity findings, including anticipation under 35 U.S.C. § 102. 87 Fed. Reg. 42950-53 (July 5, 2023). On review, the Commission has determined to take no position on the issue. *See Beloit*, 742 F.2d at 1423.

G. The ID's Finding's on the Economic Prong of the Domestic Industry Requirement

The Commission determined to review the final ID's findings on the economic prong of the domestic industry requirement. 87 Fed. Reg. 42950-53 (July 5, 2023). On review, the Commission has determined to take no position on the issue. *See Beloit*, 742 F.2d at 1423.

V. CONCLUSION

As discussed above, the Commission has determined to reverse the ID's finding of a violation of section 337. Regarding the issues under review, the Commission has determined to: (1) vacate the ID's construction of the claim term "filter usage lifetime claimed by a manufacturer or seller of the filter" and find the claim limitation indefinite; (2) reverse the ID's finding that the asserted claims are not invalid for lack of written description; (3) reverse the ID's findings that the asserted claims are enabled; (4) take no position on the ID's section 101 analysis and findings; (5) take no position on the ID's anticipation analysis and findings; and

(6) take no position on the ID's findings on the economic prong of the domestic industry requirement.

By order of the Commission.

Lisa R. Barton
Secretary to the Commission

Issued: September 22, 2023

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the parties listed have entered an appearance in the above captioned investigation, and a copy of the PUBLIC CERTIFICATE OF SERVICE was served upon the following parties via first class mail and air mail where necessary.

Document	Security	Document Type	Official Rec'd Date	Title
792892	Public	ID/RD - Final on Violation	03/22/2023 10:02 AM	Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond

Service Date: March 22, 2023

/s/

Lisa R. Barton
U.S. International Trade Commission
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Suite 112
Washington, D.C. 20436

CERTIFICATE OF SERVICE

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN HIGH-PERFORMANCE GRAVITY-FED WATER FILTERS AND PRODUCTS CONTAINING THE SAME**	**Inv. No. 337-TA-1294**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge MaryJoan McNamara

(February 28, 2023)

SELECTED SUMMARY FINDINGS

Pursuant to the Notice of Investigation, 87 Fed. Reg. 4913, dated January 31, 2022, this is the Initial Determination ("ID") of the Investigation in the Matter of Certain High-Performance Gravity-Fed Water Filters and Products Containing Same, United States International Trade Commission Investigation No. 337-TA-1294. *See* 19 C.F.R. § 210.42(a).

It is a finding of the ID that Complainant Brita LP ("Complainant" or "Brita") has proven by a preponderance of evidence that Respondent Kaz USA, Inc. ("Kaz"), Helen of Troy Limited ("Helen of Troy," and with Kaz, "the PUR Respondents"), Zero Technologies LLC ("Zero"), Culligan International Co. ("Culligan," and with Zero, "the ZeroWater Respondents"), and Vestergaard Frandsen Inc. ("LifeStraw Respondent") (collectively, PUR Respondents, ZeroWater Respondents and LifeStraw Respondent, "Respondents") have violated subsection (b) of Section 337 of the Tariff Act of 1930, in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain gravity-fed water filters and products containing same.

It is a finding of the ID that Respondents have infringed asserted claims 1-6 and 23 of U.S. Patent No. 8,167,141 ("the '141 patent"). It is also a finding of this ID that the asserted claims of the '141 patent are not invalid.

It is a finding of the ID that one or more of Brita's domestic industry products have satisfied the technical industry prong of the domestic industry requirement for the '141 patent.

It is a finding of the ID that Brita has satisfied the economic prong of the domestic industry requirement under Section 337(a)(3)(A) and (B).

This decision recommends that: (1) Limited Exclusion Orders with a standard certification provision issue against the PUR, ZeroWater and LifeStraw Respondents; (2) Cease

and Desist Orders issue against the PUR and LifeStraw Respondents; and (3) that a bond (or bonds) issue against the PUR and ZeroWater Respondents be entered during the Presidential Review Period.

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ABBREVIATIONS

The following shorthand references to the parties, related U.S. agencies, and related proceedings are used in this Initial Determination:

Complainant or Brita	Complainant Brita LP
PUR	Respondents Kaz USA, Inc. and Helen of Troy Limited
ZeroWater	Respondents Zero Technologies, LLC and Culligan International Co.
LifeStraw	Respondent Vestergaard Frandsen Inc.
Respondents	PUR, ZeroWater, and LifeStraw, collectively
Mavea	Respondents Mavea LLC and Brita GmbH
AquaCrest	Respondents EcoLife Technologies, Inc. and Qingdao Ecopure Filter Co., Ltd.
Parties	Brita and Respondents, collectively
CBP	U.S. Customs and Border Protection
PTO	U.S. Patent and Trademark Office
PTAB	Patent Trial and Appeal Board

The following abbreviations for pleadings, exhibits, briefs, transcripts, and Orders are used in this Initial Determination:

Compl.	Complaint
PUR Response	Response of Kaz USA, Inc. and Helen of Troy Limited to the Notice of Investigation and Complaint Under Section 337 of the Tariff Act of 1930, as Amended
ZeroWater Response	Response of EcoLife Technologies Inc. and Qingdao Ecopure Filter Co., Ltd. to the Notice of Investigation and Complaint Under Section 337 of the Tariff Act of 1930, as Amended
LifeStraw Response	Response of Zero Technologies, LLC and Culligan International Co. to the Notice of Investigation and Complaint Under Section 337 of the Tariff Act of 1930, as Amended

Aquacrest Response	Response of EcoLife Technologies Inc. and Qingdao Ecopure Filter Co., Ltd. to the Notice of Investigation and Complaint Under Section 337 of the Tariff Act of 1930, as Amended
CX	Complainant's exhibit
CDX	Complainant's demonstrative exhibit
CPX	Complainant's physical exhibit
CPBr.	Complainant's Corrected Pre-Hearing Brief
CBr.	Complainant's Initial Post-Hearing Brief
CRBr.	Complainant's Post-Hearing Reply Brief
CSBr.	Complainant's Supplemental Post-Hearing Brief
CSRBr.	Complainant's Supplemental Post-Hearing Reply Brief
CPSt.	Complainant's Pre-Hearing Statement
JX	Joint exhibit
RX	Respondents' exhibit
RDX	Respondents' demonstrative exhibit
RPX	Respondents' physical exhibit
RPBr.	Respondents' Corrected Pre-Hearing Brief
RBr.	Respondents' Initial Post-Hearing Brief
RRBr.	Respondents' Post-Hearing Reply Brief
RSBr.	Respondents' Corrected Supplemental Post-Hearing Brief
RSRBr.	Respondents' Supplemental Post-Hearing Reply Brief
RPSt.	Respondents' Pre-Hearing Statement
Tr.	Evidentiary hearing transcript
Dep. Tr.	Deposition transcript

COMBr.	Complainant's Opening *Markman* Brief
ROMBr.	Respondents' Opening *Markman* Brief
CMBr.	Complainant's Rebuttal *Markman* Brief
RMBr.	Respondents' Rebuttal *Markman* Brief
Joint CC Chart	Joint Claim Construction Chart (Doc. ID No. 768315 (Apr. 14, 2022))
***Markman* Order**	Order No. 30 (July 20, 2022)

The following shorthand references to certain products and patents at issue are used in this Initial Determination:

'141 patent	U.S. Patent No. 8,167,141
Asserted Patent	'141 patent
Accused PUR Plus Products	PUR Plus filters, including Mario 2 and Mario 3 versions, and with corresponding pitchers, collectively
Accused ZeroWater Products	ZeroWater filters, redesign filters, and with corresponding pitchers, collectively
Accused LifeStraw Products	LifeStraw Home filters, and with corresponding pitchers, collectively
Accused Products	PUR Plus filters, ZeroWater filters, LifeStraw Home filters, and with corresponding pitchers, collectively
DI Products	Brita LongLast Product, Brita LongLast+ Product, collectively

I. INITIAL DETERMINATION ON VIOLATION OF SECTION 337, AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

A. Overview

This Investigation is about gravity-fed water systems and filters for treating water that is taught by a single patent, U.S. Patent No. 8,167,141 ("the 141 patent"). The necessity of uncontaminated water is an issue critical to all of us. Also critical to the outcomes that are addressed in the ID are the scientific standards and protocols that Brita used to arrive at the invention claimed in the '141 patent, and then the testing that the Parties conducted on the filters at issue to determine if they remove the lead and other contaminants that the '141 patent teaches. (*See* Sections IV, VIII, and IX.). Not surprisingly, the level and detail that went into Brita's testing to arrive at the invention of the '141 patent, and the Respondents' testing of the prior art and accused products, was highly technical and granular. The testing required a detailed analysis of whether the invention of the '141 patent—carbon block and other filters-- proves that it removes the contaminates according to the teachings of the '141 patent, and if so, whether the accused products practice the claims of the '141 patent.

The testing requirements and the protocols that were used in testing were hotly contested. Without explaining in detail the scientific protocols that were used, and how the testing of the invention, the alleged Brita and other prior art products, and the accused products were conducted, the conclusions that the ID reached about the same, might not have made sense. Therefore, Sections IV, VIII and IX are the prelude to an understanding of the findings on infringement, Section X, and invalidity, Section XII, and particularly, enablement, Section XII.D.

B. Summary of Findings

A summary of this decision's finding is summarized below.

Chart No. 1: Summary of Findings

Product	Patent	Claims	Determination
Accused PUR Plus Products	’141 patent	1-3 and 23	Violation
Accused ZeroWater Products	’141 patent	1, 2, 5 and 23	Violation
Accused LifeStraw Home Filter	’141 patent	1-5	Violation
DI Products	’141 patent	1-6 and 23	Satisfied

II. BACKGROUND

A. Institution and Selected Procedural History

On January 31, 2022, Brita LP (“Complainant” or “Brita”) filed a complaint (“Complaint”) under Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, alleging infringement of claims 1-6, 20-21, and 23-24 of U.S. Patent No. 8,167,141 (“the ’141 patent”).[1] (Doc. ID No. 759243 (Dec. 27, 2022);[2] Compl. at ¶ 68.). The Complaint was amended (“First Amended Complaint”) to include Replacement Exhibit 1, a certified copy of the ’141 patent that issued with a January 11, 2022, Certificate of Correction. (Doc. ID No. 763517 (Feb. 18, 2022) at Repl. Ex. 1.).

The Commission instituted this Investigation pursuant to subsection (b) of Section 337 of the Tariff Act of 1930, as amended, on January 31, 2022. 87 Fed. Reg. 4913 (Jan. 31, 2022).

The Notice of Investigation (“NOI”) names as complainant: Brita LP of Neuchatel NE, Switzerland (“Brita”). *Id*. The NOI names as respondents: EcoLife Technologies, Inc. of City of

[1] JX-0022.

[2] This is the official received date of the original Complaint.

Industry, CA and Qingdao Ecopure Filter Co., Lt. of Shandong Province, China (collectively, "Aqua Crest Respondents" or Aqua Crest"); Kaz USA, Inc. of El Paso, TX and Helen of Troy Limited of El Paso, TX (collectively, "PUR Respondents" or "PUR"); Zero Technologies, LLC of Trevose, PA and Culligan International Co. of Rosemont, IL (collectively, "ZeroWater Respondents" or "ZeroWater"); Vestergaard Frandsen Inc. of Baltimore, MD ("LifeStraw Respondent" or "LifeStraw"); Mavea LLC of West Linn, OR; and Brita GmbH of Taunusstein, Germany (collectively, "Respondents," and with Brita, the "Parties").[3] *Id.*

Respondents Mavea LLC and Brita GmbH have been terminated from this Investigation based on a settlement agreement.[4] (*See* Order No. 13 (May 3, 2022), *unreviewed*, Comm'n Notice, (May 24, 2022).). The Aqua Crest Respondents have been terminated from this Investigation based on withdrawal of the allegations as to these respondents. (Order No. 43 (Sept. 22, 2022), *unreviewed*, Comm'n Notice, (Oct. 11, 2022).).

On February 22, 2022, PUR filed a response to the Complaint and NOI ("PUR Response"). (Doc. ID No. 763740 (Feb. 22, 2022).). In their response, PUR identified nine (9) affirmative defenses ("Affirmative Defenses"). (PUR Resp. at 30-33.).

On February 22, 2022, ZeroWater filed a response to the Complaint and NOI ("ZW Response"). (Doc. ID No. 763725 (Feb. 22, 2022).). In its response, ZeroWater identified six (6) defenses ("Defenses"). (ZW Resp. at 22-27.).

On February 22, 2022, LifeStraw filed a response to the First Amended Complaint and

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[3] Four additional entities were named as proposed Respondents in the original Complaint: Mavea LLC, Brita GmbH, EcoLife Technologies, Inc., and Qingdao Ecopure Filter Co. (Compl. at ¶ 3.). Brita withdrew the allegations against these entities. (Order No. 13 (May 3, 2022); Order No. 43 (Sept. 22 2022).).

[4] References to Respondents and/or Parties in the rest of this document do not include the terminated respondents.

NOI ("LS Response"). (Doc. ID No. 763712 (Feb. 22, 2022).). In its response, LifeStraw identified nine (9) affirmative defenses ("Affirmative and Other Defenses"). (LS Resp. at 21-25.).

As the result of one (1) ID granting Brita's partial termination of this Investigation with respect to asserted claims 20, 21, and 24 of the '141 patent, the seven (7) remaining claims that are the subject of this decision are claims 1-6 and 23 of the '141 patent. (*See* Order No. 19 (June 1, 2022).).

On May 5, 2022, Brita and Respondents each filed a *Markman* hearing proposal. (Doc. ID Nos. 769975, 769972 (May 5, 2022).). A *Markman* hearing was held on June 2, 2022. (*See* Order No. 18 (May 26, 2022); Doc. ID No. 772677 (*Markman* Hr'g Tr.) (June 9, 2022).). A *Markman* Order issued construing the claim terms in dispute. (*Markman* Order (July 20, 2022).).

On June 9, 2022, Respondents filed a motion to strike ("Motion to Strike") certain reduction to practice dates and a "genus" theory of water filters in the expert report of Dr. Benny D. Freeman.[5] (Mot. Docket No. 1294-015 (June 9, 2022).). The Motion to Strike was denied in-part with respect to striking reduction to practice dates because Respondents had been on notice at all times of an alleged conception date of May 16, 2066 and reduction to practice dates based on at least Brita's Notice of Priority Dates. (Order No. 33 at 7 (Aug. 2, 2022); Doc ID No. 764240 ("Brita LP's Notice of Patent Priority Dates/Dates of Conception") (Mar. 1, 2022).). The Motion to Strike was granted in-part as to a genus/species theory in Dr. Freeman's expert report

[5] When he testified during the Hearing on October 13, 2022, Dr. Benny D. Freeman was a Professor of Engineering at the University of Texas at Austin. (CPSt. at Att. A; CDX-0002.0002.). Dr. Freeman holds a B.S. in chemical engineering from North Carolina State University and a PhD in chemical engineering from the University of California, Berkeley. (CPSt. at Att. A.). Brita identified Dr. Freeman as an expert to testify about the validity of the '141 patent. (CPSt. at 2.). Based on his education and experience, Dr. Freeman is also qualified as an expert under FRE 703.

because a genus theory was not disclosed in contention interrogatory responses and Brita's use of the word "class" in the Complaint was not sufficient basis to claim a genus/species theory. (Order No. 33 at 13-14 (Aug. 2, 2022).).

On July 18, 2022, Brita and Respondents each filed a Pre-Hearing Brief. (Doc. ID Nos. 775727, 775726 (RPBr.) (July 18, 2022).). On July 21, 2022, Brita filed a motion for leave to file a corrected Pre-Hearing Brief, to which its corrected Pre-Hearing Brief[6] was attached.[7] (Doc. ID No. 776008 (CPBr.) (July 21, 2022).).

On July 18, 2022, Respondents filed their Pre-Hearing Statement. (Doc. ID No. 775728 (RPSt.) (July 18, 2022).). On July 20, 2022, Brita filed its Pre-Hearing Statement. (Doc. ID No. 775842 (CPSt.) (July 20, 2022.).

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[6] All references and citations to Brita's Pre-Hearing Brief are to Brita's corrected Pre-Hearing Brief.

[7] In its motion for leave, Brita stated that the Pre-Hearing Brief it filed on July 19, 2022 "contained citations to likely evidentiary hearing exhibits in the form of references to the document Bates numbers and titles rather than in the form exhibit numbers from the parties' exhibit lists." (Motion Docket No. 1294-024 (July 21, 2022).). Brita sought leave to make what it called "clerical changes" "to replace the existing citations with citations to exhibit numbers" and submitted that "[n]o substantive changes to the brief will be made." (*Id.*). Certain respondents opposed Brita's motion for leave. (Doc. ID No. 776020 (July 22, 2022).). In their opposition, the opposing respondents stated that they "do not oppose Brita's motion in an effort to prevent the ALJ from having a clear record." (*Id.* at 1.). Rather, they contended that their "opposition is based on the prejudice caused by Brita's disregard of the Ground Rules." (*Id.* (citing G.R. 8.7.4 (requiring pre-hearing briefs to contain citations to exhibit numbers)).). On July 28, 2022, Order No. 32 issued, which instructed Brita and the opposing respondents to answer several questions. (Order No. 32 at 2-3 (July 28, 2022).). In compliance with Order No. 32, Brita and the opposing respondents filed their answers to the questions listed in the Order. (Doc. ID Nos. 776559 (Brita's letter) (July 29, 2022), 776592 (respondents' letter) (July 29, 2022), 776915 (Brita's reply letter) (Aug. 2, 2022), 776914 (respondents' reply letter) (Aug. 2, 2022).). During the Pre-Hearing Conference, monetary compensation as a possible remedy to the opposing respondents' alleged prejudice was discussed and they were directed to file an affidavit(s) with the names of the individuals involved with fixing citations to their pre-hearing brief and the amount of time spent by each. (Tr. at 18:6-19, 20:7-16.). Specifically, the opposing respondents were asked to provide billed time from billing statements with hourly rates and the cumulative time spent by each affiant on correcting Brita's Pre-Hearing Brief. (*Id.*). The opposing respondents submitted affidavits (albeit incomplete) and with nothing more. (Doc. ID No. 779233 (Sept. 1, 2022).). Subsequently, the opposing respondents did not follow motions practice and did not file a motion for sanctions or for compensation. Thus, that issue is moot. Having considered all submissions on this issue, Brita's motion for leave to file a corrected Pre-Hearing Brief is *granted*. All references to Brita's Pre-Hearing Brief are to the corrected Pre-Hearing Brief, i.e., CPBr.

In accordance with the deadline set forth in Order No. 27, Brita filed two (2) motions *in limine* ("MILs") (Motion Docket Nos. 1294-025 (July 22, 2022), 1294-027 (July 22, 2022)) and Respondents filed one (1) MIL (Motion Docket Nos. 1294-026 (July 22, 2022)). Brita's and Respondents' MILs, and their respective rulings, are summarized below in Chart Nos. 2 and 3.

Chart No. 2: Brita's MILs

MIL No.	Issue	Ruling
MIL No. 1 (Motion Docket No. 1294-025) Motion *in Limine* to Preclude the Testimony of Robert Herman	Brita sought to preclude Respondents from introducing during the evidentiary hearing the invalidity opinions of their expert, Mr. Robert Herman, that are premised on a rejected claim construction. (MIL No. 1 at 1.). Brita contended that because Respondents' expert, Mr. Herman, offered opinions concerning anticipation and obviousness "solely" premised on the plain and ordinary meaning of the "average filtration unit time over lifetime L," which was rejected, Mr. Herman should be precluded from offering those opinions during the evidentiary hearing because "they are necessarily wrong, unreliable, and erroneous." (Mem. No. 1 at 1.).	Denied. (Order No. 35 (Aug. 5, 2022).). "In this instance, Respondents' arguments are persuasive. Mr. Herman's expert reports, i.e., Herman Report and Corrected Herman Report, are not stricken. He is permitted to testify during the Hearing about the term 'average filtration unit time over lifetime L.' Any testimony elicited from Mr. Herman during the Hearing with respect to this claim term will be evaluated for its weight and credibility, including his opinions contained in his expert reports concerning the same." (*Id.* at 4 (citation omitted).).
MIL No. 2 (Motion Docket No. 1294-027) Motion *in Limine* to Exclude the Testimony of Dr. Gary Hatch	Brita sought to preclude Respondents from introducing during the evidentiary hearing the opinions and testimony of their expert, Dr. Gary Hatch that are contained in his expert reports. (MIL No. 2	Denied. (Order No. 35 (Aug. 5, 2022).). "To the extent that Brita has questions about Dr. Hatch's approach or whether his expert reports accurately reflect his opinions, or whether he even understands the scope of the issues based on his own knowledge and

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MIL No.	Issue	Ruling
	at 1.). Brita argued that during Dr. Hatch's deposition on July 12, 2022, "it became all too clear that Dr. Hatch's reports do not express his own opinions but rather serve as a mouthpiece for Respondents' counsels' arguments." (*Id.* at 1.). According to Brita, "Dr. Hatch repeatedly did not recognize entire theories and analysis that had been asserted in his report." (*Id.* at 4.). Brita contended that "[b]ecause Dr. Hatch was not able to speak in detail at his deposition of his own independent invalidity assessment, Brita did not get a full and fair opportunity to investigate his theories before trial[,]" and will thus be prejudiced if Dr. Hatch is allowed to testify during the evidentiary hearing. (*Id.* at 15-16.).	recollection and without coaching by counsel, the proper course of action is for Brita to question Dr. Hatch during the Hearing, and not to preclude the ***entirety*** of his testimony." (*Id.* at 9 (emphasis in original).). "Any testimony elicited from Dr. Hatch during the Hearing will be evaluated for its weight and credibility." (*Id.* at 10.).

Chart No. 3: Respondents' MIL

MIL No.	Issue	Ruling
MIL No. 1 (Motion	Respondents sought to	Denied.[8] (Order No. 37 (Aug. 9,

[8] During the Hearing, the issue of the existence of additional Brita Legacy filters was raised again. On August 13, 2022, Brita was instructed to submit a declaration with respect to "whether there were other Brita legacy filters available [other than the 1999 filter] that could have been used for comparison testing at the time[.]" (Tr. at 425:13-18.). Brita filed a declaration from Mr. Joseph McShane ("McShane Declaration") who, at the time he signed the declaration, was the Director of Research & Development for Brita. (Doc. ID No. 778985 (McShane Decl.) at ¶ 1 (Aug. 29, 2022).). Mr. McShane stated that he understood "Respondents have tested certain Brita granular filters that are dated from the 1999 time period," and after physical searches of two (2) Brita facilities, identified in a chart six (6) Brita granular

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MIL No.	Issue	Ruling
Docket No. 1294-026) Motion *in Limine* to Exclude Brita's Belated Contentions on the Brita Legacy Filter	preclude Brita from presenting argument and evidence during the evidentiary hearing relating to any alleged changes made to the 1999 Brita Legacy prior art filter before the filing of the '141 patent because: (i) Brita refused to produce documents regarding the Brita Legacy filter or physical samples during discovery; and (ii) Brita's corporate witness testified that the Brita Legacy filter was the only gravity filter sold at the time and that Brita was not aware of any changes made to the filter, representations upon which Respondents claim they relied to prepare their invalidity case. (MIL No. 1 at 1, 4.).	2022).). "Respondents' suggestion that Brita did not comply with its discovery obligations is untimely. As Brita points out, if Respondents had concerns with Brita's production or discovery responses, Respondents should have timely raised them with Brita or engage in motions practice." (*Id.* at 4.). "As Brita notes, any changes made to the Brita Legacy Filter before 2006 pre-dated Dr. Knipmeyer's employment at Brita and was beyond her personal knowledge as she testified. (Opp'n at 8.). Dr. Knipmeyer herself was clear about that. It was improper for Respondents to rely on Dr. Knipmeyer's statement as if it were an affirmative answer that there were no changes to the Brita Legacy Filter. Her testimony is her testimony. Brita will be held during the Hearing to the legacy filters it has identified during discovery upon which it will rely, as well as to the statements Brita has made in pre-hearing submissions without limiting Dr. Knipmeyer's testimony to a statement

filters manufactured between 1998 and 2000. (*Id.* at ¶¶ 2, 4-5.). During the supplemental Hearing held on October 13, 2022, Respondents' counsel stated that he did not "see anything in the record . . . limit[ing] the charts to these couple of years" and sought clarification regarding the "seven or eight years prior to when the ['141] patent application was filed [2001 to 2008] when testing was presumably happening that Brita has not provided an answer[.]" (Tr. at 1392:23-1393:8.). Brita's counsel asserted that Brita "always maintained that there were differences in the filter in that [2001 to 2008] time period," "[t]he same filter, the one from '99, included information in the '98 and 2000 filter," and "confirmed that, yes, we have some filters in our possession," which appear to be the filters listed in the McShane Declaration. (*Id.* at 1394:1-12.). Brita's counsel also noted that Respondents did not raise any concerns about the scope or responsiveness of the McShane Declaration until the October 13, 2022 Hearing, which Brita's counsel pointed out was five (5) weeks since the McShane Declaration was filed. (*Id.* at 1395:1-3.). Respondents' "concern[] about what's going on with this seven-year period and whether there are other filters available" was found to be "a little late now . . . . [I]f the Respondents were as concerned . . . as you say, this should have been raised much sooner after the declaration was filed, and it wasn't. So the record is what it is right now." (*Id.* at 1396:11-24.).

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MIL No.	Issue	Ruling
		she clearly did not make." (*Id.* at

The evidentiary hearing ("Hearing") was held on August 17-19, 22-23, 2022 and October 13, 2022. (*See* Order Nos. 7 at Att. A (Feb. 9, 2021), 42 (Aug. 29, 2022).).

On September 9, 2022, Brita and Respondents each filed a Post-Hearing Brief. (Doc. ID Nos. 779896 (CBr.), 779902 (RBr.) (Sept. 9, 2022).). Respondents filed a notice of errata to their Post-Hearing Brief. (Doc. ID No 784393 (Nov. 14, 2022).).

On September 19, 2022, Brita and Respondents each filed a Post-Hearing Reply Brief. (Doc ID Nos. 780601 (CRBr.), 780600 (RRBr.) (Sept. 9, 2022).).

Additional briefing was ordered to address only issues raised during the October 13, 2022 Hearing. (Order No. 44 (Sept. 23, 2022).). On October 24, 2022, Brita and Respondents each filed a Supplemental Post-Hearing Brief. (Doc. ID Nos. 782958 (CSBr.), 782967 (Oct. 24, 2022).). On October 28, 2022, Respondents filed a corrected Supplemental Post-Hearing Brief.[9] (Doc. ID No. 783310 (RSBr.) (Oct. 28, 2022); Order No. 50 (Oct. 31, 2022).).[10]

On October 31, 2022, Brita and Respondents each filed a Supplemental Post-Hearing Reply Brief. (Doc. ID Nos. 783487 (CSRBr.), 783482 (RSRBr.) (Oct. 31, 2022).).

On November 1, 2022, Brita and Respondents filed a joint outline of the issues. (Doc. ID No. 783521 (Nov. 1, 2022).). On November 21, 2022, errata to the Hearing transcript was

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[9] All references and citations to Respondents' Supplemental Post-Hearing Brief are to Respondents' corrected Supplemental Post-Hearing Brief.

[10] A supplemental hearing was held on October 13, 2022 because Respondents' expert on invalidity became ill and could not testify when he was originally scheduled. The October date was selected for a supplemental hearing, which also accommodated Brita's expert on invalidity.

granted. (Order No. 51 (Nov. 21, 2022); Doc ID No. 786499 (Corrected Tr.) (Dec. 16, 2022).).

B. The Parties

1. Complainant Brita LP

Brita LP is an Ontario limited partnership organized under the laws of Canada with an office in Switzerland. (*See* Tr. (Lauren Kahn)[11] at 240:2-14; CBr. at 3-4.). Brita LP is a subsidiary of The Clorox Company. (*See* Tr. (Kahn) at 240:2-8.).

In the Complaint, Brita described itself as follows:

> Brita is America's #1 brand of water filtration and has been America's trusted source of filtered water for over 30 years. It is a leader in the consumer water filter product market because of its ability to provide filter products that meet consumer needs in a gravity-fed system.
>
> * * *
>
> Brita's Domestic Industry Products ("DI Products") . . . include the LongLast and LongLast+ filters and containers that use the same[.]
>
> * * *
>
> A significant portion – virtually all – of the activities related to the research and development, product support, distribution, marketing, and sales of the DI Products takes place in the United States.

(Compl. at ¶¶ 17, 19, 122.).

2. Respondents

a) Kaz USA, Inc.

Kaz USA, Inc. ("Kaz," and with Respondent Helen of Troy Limited, "PUR" or "PUR Respondents") is a corporation organized under the laws of the state of Massachusetts. (*See* PUR Resp. at ¶ 30.). Kaz confirmed that it is a subsidiary of Helen of Troy Limited. (*See id.*).

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[11] Lauren Kahn, Brita's fact witness, at the time of the evidentiary hearing, was employed by Clorox Company as senior director of marketing, and commercial leader for the Brita Business. (Tr. (Kahn) at 236:24-237:3; CPSt. at 2.). Ms. Kahn was called to testify as to the commercial success and the industry's praise of Brita's domestic industry products. (*Id.*).

Kaz also confirmed that it is involved with the distribution and sale of certain Accused PUR Plus Products. (*See id.* at ¶ 31.).

b) Helen of Troy Limited

Helen of Troy Limited ("Helen of Troy," and with Kaz, "PUR" or "PUR Respondents") is a corporation organized under the laws of Barbados. (*See* PUR Resp. at ¶ 32.). Helen of Troy confirmed that it is affiliated with Kaz. (*See id*.). Helen of Troy also confirmed that it is involved with the design and development of the Accused PUR Plus Products. (*See id.* at ¶ 33.). In its response to the Complaint, Helen of Troy denied that Helen of Troy sells products under the PUR brand. (*See id*.).

c) Zero Technologies, LLC

Zero Technologies, LLC ("Zero Technologies," and with Culligan International Company, "ZeroWater" or "ZeroWater Respondents") is a corporation organized under the laws of the state of Delaware. (*See* ZW Resp. at ¶ 35.). Zero Technologies confirmed that it has a place of business in Trevose, Pennsylvania. (*See id*.). Zero Technologies also confirmed that it lists ZeroWater water filters for sale on its website. (*See id.* at ¶ 36.).

d) Culligan International Co.

Culligan International Co. ("Culligan," and with Zero Technologies, "ZeroWater" or "ZeroWater Respondents") is a business organized under the laws of the state of Delaware. (*See* ZW Resp. at ¶ 37.). Culligan confirmed that it has a place of business in Rosemont, Illinois. (*See id*.). Culligan also confirmed that it is the parent company of Zero Technologies and Culligan lists ZeroWater as one of its brands on its website. (*See id.* at ¶ 38.).

e) Vestergaard Frandsen Inc.

Vestergaard Frandsen Inc. ("LifeStraw" or "LifeStraw Respondent") is a corporation doing business as LifeStraw that has a place of business in Baltimore, Maryland. (*See* RBr. at 9;

Compl. at Ex. 43.). LifeStraw also confirmed that it is involved in the manufacture, distribution, sale for importation, importation, and sale after importation of the Accused LifeStraw Products. (*See* LS Resp. at ¶ 41.).

III. JURISDICTION, IMPORTATION, AND STANDING

A. The Commission Has Jurisdiction

To have the authority to decide a case, a court or agency must have jurisdiction over either the parties or the property involved. *See Certain Steel Rod Treating Apparatus and Components Thereof*, Inv. No. 337-TA-97, Comm'n Opinion, 215 U.S.P.Q. 229, 231 (U.S.I.T.C. 1981). For the reasons discussed below, the facts support a finding that the Commission has jurisdiction over this Investigation.

1. Personal Jurisdiction

Respondents have appeared and responded to the Complaint and NOI, and fully participated in this Investigation, which included participating in discovery and the Hearing, and by filing motions. Thus, the Commission has personal jurisdiction over Respondents. *See, e.g.*, *Certain Microfluidic Devices* ("*Microfluidic Devices*"), Inv. No. 337-TA-1068, Initial Determination, 2018 WL 5279172, at *16 (Sept. 20, 2018); *Certain Windshield Wiper Devices and Components Thereof* ("*Wiper Devices*"), Inv. No. 337-TA-881, Initial Determination, 2014 WL 2334287, at *6 (May 8, 2014) (unreviewed in relevant-part).

2. *In Rem* Jurisdiction

Section 337(a)(1)(B) applies to the "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation" of articles that infringe a valid and enforceable United States patent." 19 U.S.C. § 1337(a)(1)(B). A single instance of importation is sufficient to satisfy the importation requirement of Section 337. *Certain Optical Disc Drives, Components Thereof, and Prods. Containing the Same*, Inv. No. 337-TA-897,

Order No. 101 at 3 (Sept. 22, 2014) (citations omitted) (Doc. ID No. 543438).

Brita and PUR stipulated that the Accused PUR Plus Products have been and are imported into the United States to satisfy the importation requirements of 19 U.S.C. § 1337(a)(1)(B), (C). (Doc. ID No. 770417 at 1-2.).

Brita and LifeStraw stipulated that the Accused LifeStraw Products have been and are imported into the United States to satisfy the importation requirements of 19 U.S.C. § 1337(a)(1)(B), (C). (JX-0020.0001-02.).

Zero Technologies confirmed that it imports and sells its Accused ZeroWater Products in the United States. (RPBr. at 11.). Thus, Zero Technologies does not dispute importation.

Culligan disputes that it manufactures, distributes, sells for importation, imports or sells after importation the Accused ZeroWater Products. (*Id.*; *see also* Section III(A); RBr. at 116 (Affirmative Defense on Standing).).

Because of importation stipulations of all Accused Products, the Commission has *in rem* jurisdiction over the Accused Products. *See, e.g.*, *Wiper Devices*, Inv. No. 337-TA-881, Initial Determination at 5 (*in rem* jurisdiction exists when importation requirement is satisfied).

B. Brita Has Standing in the Commission

Jurisdiction requires standing. *See SiRF Technology, Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1326 (Fed. Cir. 2016) (standing to bring an infringement suit is the same under Commission Rules as it would be in a Federal District Court case); *Certain Optical Disc Drives, Components Thereof and Prods. Containing Same*, Inv. No. 337-TA897, Opinion Remanding the Investigation at 4 (Jan. 7, 2015). Commission Rule 210.12 requires that intellectual property-based complaints filed by a private complainant "include a showing that at least one complainant is the exclusive license of the subject intellectual property." 19 C.F.R. § 210.12(a)(7).

Brita argued that it has standing to bring suit for infringement under Section 337 because Brita owns by assignment the full right, title and interest in the '141 patent. (*See* Compl. at Exs. 66-68 (Assignments of the '141 patent from inventors Knipmeyer and Lynch to Brita (Ex. 66 to Compl.); from inventors Reid and Saaski to a non-party, Omnipure Filter Company, Inc. ("Omnipure") (Ex. 67 to Compl.); and from Omnipure to Brita ("Omnipure Assignment," Ex. 68 to Compl.); CPBr. at 128.). On its face, the December 22, 2021 Omnipure Assignment clearly "grants" to assignee (Brita):

> the entire right, title and interest in and to the invention known as "**GRAVITY FLOW FILTER**," for which an application was filed in the United States Patent and Trademark Office on September 9, 2008 and given Serial No. 12/207,284 which patent application and its resulting Patent No. 8,167,141 are hereby assigned, transferred and set over to Assignee.

(Omnipure Assignment, Ex. 68 to Compl.) (emphasis in original); *see also* CX-0921 (Omnipure Assignment, PTO Recordation).).

The last paragraph of the Omnipure Assignment also grants to Brita "all right title and interest, in and to the subject invention, patent application and patent; . . . including the right to sue for past infringements." (*Id*.).

Notwithstanding, the evidence that Omnipure assigned its rights in the '141 patent to Brita (Ex. 68 to Compl.), and with that knowledge, Respondents nonetheless initially challenged Brita's standing to bring suit by claiming that Brita did not maintain all of its 'substantial rights' to the '141 patent. (RPBr. at 133 (citing *Aspex Eyewear, Inc. v. Miracle Optics, Inc*., 434 F.3d 1336, 1344 (Fed. Cir. 2006) ("*Aspex Eyewear*") (finding that where no right to sue existed in a license agreement, there is no ownership of a patent, and remanding case for additional proceedings)); RBr. at 116-17.). However, *Aspex Eyewear* does not apply here, because as recited, the Omnipure Assignment clearly gives Brita the right to control the prosecution for infringement of the '141 patent.

Public Version

CONFIDENTIAL MATERIAL OMITTED

In support of their argument, which also fails, Respondents initially cited to a [redacted] (*See* RX-0500C.). Respondents essentially argued that the [redacted] supersedes the later Omnipure Assignment. (*See* RX-0500C at §§ 1.2, 1.5, 4.2; *see also* RPBr. at 134; RBr. at 116-121; *see also* CDX-0001C.50 (CLA excerpts).). Respondents claimed that the [redacted] (RX-0500C at § 1.2.).). However, as Brita argued, with supporting evidence from the [redacted] itself, [redacted] (CPBr. at 128 (emphasis added) (citing *Alfred E. Mann Found. for Sci. Research v. Cochlear Corp.*, 604 F.3d 1354, 1360 (Fed. Cir. 2010) (holding that a license to a patent must be exclusive)); CBr. at 73; RX-0500C at § 4.2; *see also* CDX-0001C.0050.). Brita has the standing to sue Respondents in this Investigation.

IV. OVERVIEW OF RELEVANT TECHNOLOGY

The technical/scientific concepts described below are pertinent to the infringement, technical domestic industry, and validity testimony and evidence that support the analysis discussed in this ID.

A. Gravity flow filtration

Water filters are used in both industry and in the home to remove undesirable

contaminants. (JX-0022 at 1:22-30.). Two types of household water filter systems are: (1) a pressurized system, such as a filter mounted to a faucet; or (2) a low-pressure system, such as a filter as part of a pour-through water pitcher. (*Id.* at 1:31-39.). Low-pressure systems operate under the force of gravity as water flows through a filter into a water collection receptacle. The filter in gravity-flow filtration can take the form of a well-known and commercially available "filter block" manufactured from granular activated carbon, a binder, and additives such as a lead sorbent. (*Id.* at 1:65-2:2.). A typical pour-through water carafe 1 and filter 20 are shown in Figure No. 1 below.

Figure No. 1: Pour-Through Carafe with a Carbon Block Filter

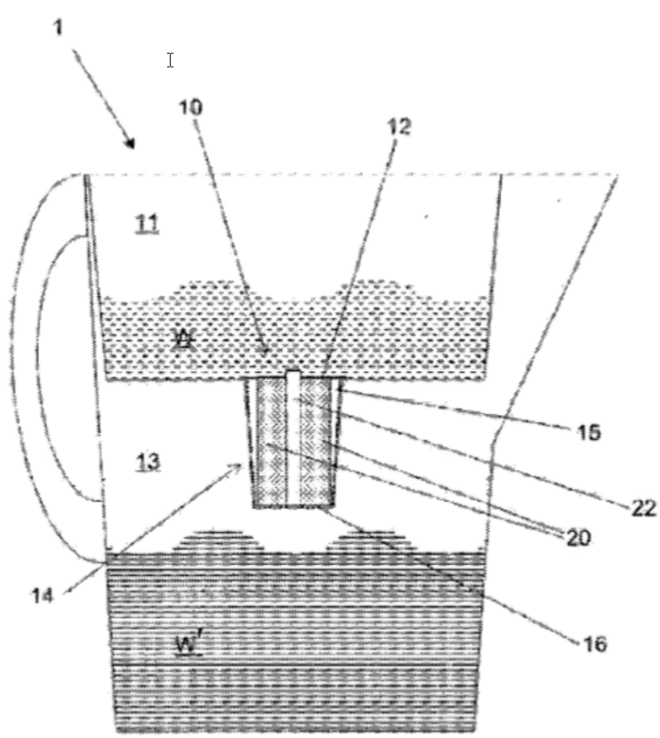

FIG. 1

(JX-0022 at Fig.1.).

Water flows from the upper reservoir 11 to lower reservoir 13 through the filter 20. (*Id*. at 12:53-58.).

The National Sanitary Foundation International[12] ("NSF") issued a standard, including a February 2007 revision ("NSF/ANSI 53-2007 standard"),[13] to "establish minimum requirements for materials, design and construction, and performance of point-of-use and point-of-entry drinking water treatment systems that are designed to reduce specific health-related contaminants in public or private water supplies." (RX-0084 at § 1.1.). One of the contaminants that the NSF/ANSI 53-2007 standard sought to reduce was lead as characterized by content of total lead, total particulate lead, and total particulate lead between 0.1 and 1.2 microns in size. (*Id*. at § 7.4.3, Table 14.).

Respondents' expert witness, Mr. Robert Herman[14], testified that the NSF/ANSI 53-2007

[12] National Sanitary Foundation International in Ann Arbor, Michigan is "an independent, not-for-profit, non-governmental organization, [is] dedicated to being the leading global provider of public health and safety-based risk management solutions while serving the interests of all stakeholders." (RX-0084 (NSF/ANSI 53-2007 standard) at title page 2, ii.).

[13] The NSF/ANSI 53-2007 standard was designated as an ANSI Standard, February 5, 2007, American National Standards Institute. (RX-0084 at i.).

[14] When he testified during the Hearing on August 22-23, 2022, Mr. Robert Herman was a Principle Consultant at Herman & Associates LLC. (RPSt. at Ex. 1.). Respondents identified Mr. Herman as an expert witness to testify about "technical matters relating to [the] asserted patent, testing of products at issue in this Investigation, testing of the prior art products, the state of the art at the time of the inventions of the asserted patent, the invalidity, indefiniteness, and/or unenforceability of the asserted patent, the level of one skilled in the art of the asserted patent, the understanding of one skilled in the art of claims and claim terms of the asserted patent, the functionality, design, and operation of products accused of infringement in this Investigation as well as products relating to domestic industry." (*Id.* at 2.). Prior to Herman & Associates LLC, Mr. Herman was employed by NSF International for some 35 years. (Tr. (Herman) at 1008:1-1009:13.). In 2004, he was "working with lead, specifically for NSF Standard 53, and assigned by NSF to be the primary investigator on determining why we were having some issues with the then current standard." (*Id.* at 1009:2-6.). Mr. Herman "ended up chairing the task group that was responsible for investigating and developing a new protocol and validating that protocol for NSF Standard 53 [2007][.]" (*Id.* at 1009:7-13.). Based on his education and experience, Mr. Herman is also qualified as an expert under Rule 703 of the Federal Rules of Evidence ("FRE").

standard addressed a concern about lead particulates, "so we have a specification on how much colloidal lead must be there, and then within that a percentage of it that must be fine." (Tr. (Herman) at 1017:15-18.). Mr. Herman explained that the standard uses the term "particulate lead" and the '141 patent uses the term "colloidal lead," and both terms mean lead particles having sizes greater than 0.1 microns. (*Id*. at 1015:18-1016:4.). Mr. Herman explained that "fine lead" are lead particles having a size of 0.1-1.2 microns and "essentially, everything around 1 micron and down effects on water filtration and filter's ability to remove lead." (*Id*. at 1016:16-19.).

With increasing awareness and desire to purify tap water in the home by the public, and in view of the NSF/ANSI 53 standard that would include specifications for particulate lead removal, Dr. Elizabeth Knipmeyer testified that filter designers focused on removing lead ("Pb") from source water.[15] (Tr. (Knipmeyer) at 155:9-14, 163:21-164:164:11, 172:10-14.).

A typical material used in water filters is activated carbon. "Activated carbon granules can, for example, be formed directly by activation of coal or other materials, or by grinding carbonaceous material to a fine powder, agglomerating it with pitch or other adhesives, and then converting the agglomerate to active carbon." (JX-0022 at 13:36-40.). "The filtration cartridge typically employed in pour-through (or gravity flow) systems hold blended media of approximately 20x50 mesh granular activated carbon and either an ion exchange resin, . . . , or a natural or artificial zeolite that facilitates the removal of certain heavy metals, such as lead and copper." (*Id*. at 1:51-57.).

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[15] At the time she provided her testimony on August 17, 2022, Dr. Elizabeth Knipmeyer was Associate Director of Research and Development with the Brita Division at The Clorox Company. (Tr. (Knipmeyer) at 153:17-154:2; CPSt at 2.). She is a named inventor of the '141 Patent. (*Id.*). Brita identified Dr. Knipmeyer as a fact witness to testify about "the development of the claimed invention." (*Id.*).

Dr. Knipmeyer testified that a "carbon block is a filter for water that is solid, three dimensional. You can pick it up and hold it on its own. And it's comprised of carbon, activated carbon, that's held together usually with a binder. That makes a porous structure to do mechanical and chemical filtration. Oftentimes you include additional sorbent materials to go after specific contaminants, like a lead sorbent, for example." (Tr. (Knipmeyer) at 174:6-13.). Dr. Knipmeyer explained Brita's work on gravity-fed water filters that were more porous than pressure-mount filters to allow for water to flow through the filters. (*Id*. at 174:21-175:7.).

Dr. Knipmeyer testified that conventional pitcher filters used larger granules of activated carbon, compared to carbon block filters, and the activated carbon was mixed with ion exchange resin. (*Id*. at 175:12-15, 23-24.).

V. THE ASSERTED PATENT

A. Overview of the Asserted Patent

The '141 patent is entitled "Gravity Flow Filter." (JX-0022 at (54).). The '141 patent was filed on September 9, 2008 as U.S. Patent Application No. 12/207,284 ("the '284 application"). (*Id*. at (22).). The '284 application is a continuation-in-part of U.S. Patent Application No. 11/858,765, filed on September 20, 2007, and a continuation-in-part of U.S. Patent Application No. 11/927,372, filed on October 29, 2007. (*Id*. at (63).). The '284 application claims priority to U.S. Provisional Application No. 60/846,162, filed on September 20, 2006. (*Id*. at (60).). The '141 patent issued on May 1, 2012 and names Elizabeth L. Knipmeyer, Toni L. Lynch, Roger P. Reid and Bruce D. Saaski as co-inventors. (*Id*. at (45), (75).). Brita owns by assignment all right, title and interest, in and to the '141 patent. (*See* Compl. at ¶ 62, Exs. 66-68.).

The '141 patent is generally directed to gravity-fed water filters comprising filter media

including activated carbon. (JX-0022 at Abstract.). The filters have a performance characterized by a "Filter Rate and Performance" ("FRAP") factor of about 350 or less. (*Id.*; *see also id.* at 12:13-28.).

B. The Asserted Claims of the Asserted Patent

The asserted claims of the '141 patent generally relate to a gravity-fed water filter and a gravity-flow system for filtering water containing the filter. (*See, e.g.*, JX-0022 at cls. 1, 23.).

As noted above, at issue in this Investigation are claims 1-6 and 23 of the '141 patent. Independent claim 1, as well as the dependent claims, are reproduced below.[16]

> 1. A *gravity-fed water filter*, comprising:
>
> filter media including at least activated carbon and a <u>lead scavenger</u>,
>
> wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:
>
> $$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$
>
> where:
>
> V = <u>volume of the filter media</u> (cm^3),
>
> f = <u>average filtration unit time over lifetime L</u> (min/liter),
>
> c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter, and
>
> L = <u>filter usage lifetime claimed by a manufacturer or seller of the filter</u> (gallons).
>
> 2. The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200.
>
> 3. The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3.
>
> 4. The water filter as recited in claim 3, wherein the volume of the filter

[16] The Parties agreed upon the meaning of the italicized claim terms, which were adopted in the *Markman* Order. The Parties disputed the meaning of the underlined claim terms. The disputed terms were analyzed and construed in the *Markman* Order.

media (V) is less than about 150 cm^3.

5. The water filter as recited in claim 5, wherein the average filtration unit time (f) is less than about 12 minutes per liter.

6. The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 6 minutes per liter.

23. A gravity-flow system for filtering water, comprising:

a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water;

a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir; and

a filter as recited in claim 1 disposed within the cartridge.

(JX-0001 at cls. 1-6, 23.).

VI. THE PRODUCTS AT ISSUE

A. Accused PUR Plus Products

Brita stated that the Accused PUR Plus Products include Accused PUR Plus Filters sold separately, and those filters sold with Accused PUR Plus Containers.[17] (CBr. at 10.). Brita alleged that the Accused PUR Plus Filters include model numbers PPF951K (filter), PPF951K1 (filter 1 pack), and PPF951K3 (filter 3 pack). (*Id*.). The Accused PUR Plus filters include the Mario 2 and Mario 3 versions of the accused filters. (*Id*. at 11.). The Accused PUR Plus Containers are listed below in Chart No. 4.

Chart No. 4: Accused PUR Plus Containers

Container	Model Number(s)	Sources
PUR Plus 7 Cup	PPT711W, PPT711B,	Tr. (David A. Rockstraw)[18] at 470:5-471:1;

[17] Brita does not allege infringement against PUR containers imported or sold after importation without a PUR Plus Filter. (CBr. at 10 n.1.).

[18] When he testified during the Hearing on August 18-19, 2022, Dr. David A. Rockstraw worked as an

Pitchers	PPT711G, PPT711K	CX-0755C.0011-12 (PUR Suppl. Resp. to Interrog. No. 1) (identifying PUR Plus filters, pitchers, and dispensers); JX-0019C (PUR Importation Stipulation identifying PUR Plus Filters) at ¶¶ 1-2; CX-0493C.0010-15, 18-19 (Helen of Troy Price List) (listing gravity-fed PUR Plus filters, pitchers, and dispensers); CX-0491C.0053-55 (PUR sales spreadsheet identifying "Lead Systems" which are PUR Plus Containers).
PUR Plus 11 Cup Pitchers	PPT111W, PPT111B, PPT111M, PPT111Q, PPT111G, and PPT111U.	
PUR Plus 12 Cup Pitchers	PPT002O	
PUR Plus 30 Cup Pitchers	DS1811Z and DS1811B	

(*Id.*).

B. Accused ZeroWater Products

The Accused ZeroWater Products include model numbers ZR-001-2T, ZR-001-C, ZR-001-2I, F1packj12cartret-con, ZR-012, ZR-017-2i, ZR-017-2T, ZR-017C, ZR-017, ZR-017-INTL2i, F2packj12cart-con, ZR-017C-2, ZR-003, ZR-003-5PDQ-CVR, ZR-006-2, ZR-006-2T, R-006-1, FRpackj12cart-con, ZR-006, ZR-006-WM, F6pkcart-net, ZR-006-TG, F8packj12carts, ZR-008-1, ZR-008, ZP-006-B, ZP-006-C, and ZP-006-D.[19] (*Id.* at 12.). The redesign filters are also accused products: model numbers XP-006-A, ZP-006-B, ZP-006-C, and ZP-006-D. (*Id.*).

The Accused ZeroWater Containers are sold with an Accused ZeroWater Filter. (*Id.* at 13.). The Accused ZeroWater Containers are listed in Chart No. 5, below.

Chart No. 5: Accused ZeroWater Containers

Container	Model Number(s)	Sources

expert witness and/or consultant. (CPSt. at Att. B.). Brita identified Dr. Rockstraw as an expert to testify about "issues related to infringement, domestic industry, and validity[.]" (*Id.* at 3.). Dr. Rockstraw has a B.S. in chemical engineering from Purdue University and a PhD in chemical engineering from The University of Oklahoma. (Tr. (Rockstraw) at 458:22-459:2.). He was accepted as an expert in the fields of chemical and materials engineering. (*Id.* at 463:5-13.). Based on his education and experience, Dr. Rockstraw qualified as an expert under Rule 703 of the Federal Rules of Evidence ("FRE").

[19] Brita does not allege infringement against ZeroWater containers imported or sold after importation without an Accused ZeroWater Filter. (CBr. at 11 n.3.).

ZeroWater 6 Cup Pitchers	ZP-006-4-2T, ZP-006-4, ZP-006, ZP-006-3-Web, Fz6pitchercon, FZ6pitcherR-2, ZP-006NFM	Tr. (Rockstraw) at 484:5-14; CX-0778C.0007, 10 (ZeroWater Obj. and Resp. to Interrog. Nos. 1 and 3); CX-0519C (identifying ZeroWater model numbers); CX-0569C (same); CDX-0008C.0036 (listing Accused ZeroWater Product model numbers based on same); CX-0570C.0001 (same)
ZeroWater 7 Cup Pitchers	ZP-007RP-2T, ZP-007RP-C, ZP-007R9-INTL2i, ZP-007RPA, ZP-007RP, ZP-007RP-2P, ZP-007RP-Con	
ZeroWater 8 Cup Pitchers	ZR-08410Ncon, ZR-0810G-2T-N, ZR-0810G-N	
ZeroWater 10 Cup Pitchers	ZD-010C, ZP-010, ZP-010-NF, ZD-010RP-2T, ZD-10RP-C, ZD-010RP, ZP-010RP-3-Web, FZ10RP-web, ZD-010RP-2P, ZR-0810-4-2T-N, ZR-0810-4-N, ZR-0810-4-Ncon, ZR-0810-2PK	
ZeroWater 11 Cup Pitchers	ZS-011RP-2T-N, ZS-011RP-2T-2PN, ZS-011RP-2-N	
ZeroWater 12 Cup Pitchers	ZD-012RP-2T, ZD-12RP-C, ZD-012rp, ZD-012RP-2, FZ12rp-web	
ZeroWater 20 Cup Pitchers	ZD-20RP-2T-N, ZD-20RPN, ZD-20RP-2-N, ZD-20RP-INTL1, ZD-20-1PK, ZD-20PK1-3PDQ-CVR, ZD-20RP-Ncon	
ZeroWater 23 Cup Pitchers	ZD-023C, FZ23dispconsumer, ZD-23-1PK, ZD-23PK1-3PDQ-CVR, ZD-018, ZD-018-2T	
ZeroWater 30 Cup Pitchers	ZBD-030-2T, ZBD-030-1, ZD-030RP-C, ZD-030RP-3-Web, ZD-030RP, ZD-030RP-Con, ZD-030RP-2T	
ZeroWater 40 Cup Pitchers	ZBD-040-INTL1, ZBD-040-INTL2, ZBD-040-1	
ZeroWater 5 Gallon water Cooler System	ZJ-004	

(*Id*. at 13-14.).

C. Accused LifeStraw Products

The Accused LifeStraw Home Products include the Accused LifeStraw Home Filter and

the Accused LifeStraw Home Containers that are sold with an Accused LifeStraw Home Filter.[20] (*Id*. at 14.). The Accused LifeStraw Home Filters are listed below in Chart No. 6.

Chart No. 6: Accused LifeStraw Home Filters

Filter	Model Number(s)	Sources
LifeStraw Home; Membrane Microfilter and Activated Carbon + Ion Exchange Filter; Replacement	LSH7SPRF01, LSH7SPC101	Tr. (Rockstraw) at 502:13-23; JX-0020.0001 (LifeStraw Importation Stipulation) ¶¶ 1-2; CX-0774C.0007, 22-23 (LifeStraw Obj. and Resp. to Interrog. Nos. 1, 10-11); CDX-0008C.0083 (listing Accused LifeStraw Home model nos. based on same)
LifeStraw Home; Activated Carbon + Ion Exchange Filter; Replacement; 2-Pack	LSH7SPC201	
LifeStraw Home; Activated Carbon + Ion Exchange Filter; Replacement; 3-Pack	LSH7SPC301	
Pack of 1 year replacement filter for Home (1 Membrane + 6 carbon filters)	DS1811Z and DS1811B	

(*Id*. at 15.).

The accused container and filter combinations are listed below in Chart No. 7.

Chart No. 7: Accused LifeStraw Home Containers

Container	Model Number(s)	Sources
LifeStraw Home Dispenser	LSH18DSWH31	Tr. (Rockstraw) at 502:13-23; JX-0020.0001 (LifeStraw Importation Stipulation) ¶¶ 1-2; CX-0774C.0007, 22-23 (LifeStraw Obj. and Resp. to Interrog. Nos. 1, 10-11); CDX-0008C.0083 (listing Accused LifeStraw Home model nos. based on same); Tr. (Hill) at
LifeStraw Home Glass 7 Cup Pitchers	LSH7GLWH07, LSH7GLBL07	
LifeStraw Home Plastic 7 Cup Pitchers	LSH7PLWH01, LSH7PLAQ01, LSH7PLGY01, LSH7PLWH02	
LifeStraw Home BPA Free 7 Cup Pitchers	LSHFP7CAQ1, LSHFP7CWH1, LSHFP7CGR1	
LifeStraw Home 7 Cup Pitchers with Silicone Base	LSH7GLSSB1, LSH7GLSWH1	

[20] Brita does not allege infringement against LifeStraw containers imported or sold after importation without an Accused LifeStraw Filter. (CBr. at 14 n.4.).

LifeStraw Home 10 Cup Pitchers	LSH10PLAQ1, LSH10PLGY1, LSH10PLWH1	933:19-934:7
LifeStraw Home BPA Free 10 Cup Pitchers	LSHFP10AQ1, LSHFP10GRA1, LSHFP10WH1	
LifeStraw Home Plastic 10 Cup Pitchers with Carbon Replacement Filter 2-Pack	LSH10GYCB1, LSH10WHCB1, LSH10AQCB1	
LifeStraw Home Plastic 10 Cup Pitchers with Carbon Replacement Filter 5 Pack	LH10NPLWHCB521	

(*Id*. at 15-16.).

D. Brita's DI Products

Brita asserted that the following Brita products practice one or more claims of the Asserted Patent: (i) Brita LongLast Product ("LongLast"); and (ii) Brita LongLast+ Product ("LongLast+" recently rebranded as "Elite" and with LongLast, "DI Products"). (*See, e.g.*, CPBr. at 9; CBr. at 9; Compl. at ¶¶ 19, 48.).

VII. PERSON OF ORDINARY SKILL IN THE ART

A. Legal Standard

A hypothetical person is a person of ordinary skill and "ordinary creativity." *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 420 (2007). "Factors that may be considered in determining [the] level of ordinary skill in the art include: (1) the educational level of the inventor[s]; (2) type of problems encountered in the art; (3) prior art solutions to the problems; (4) rapidity with which inventions are made; (5) sophistication of the technology; and (6) educational level of active workers in the field." *Envtl. Designs Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 696-97 (Fed. Cir. 1983) (citations omitted). "These factors are not exhaustive but merely a guide to determining the level of ordinary skill in the art." *Daiichi Sankyo Co. v. Apotex, Inc.*, 501

F.3d 1254, 1256 (Fed. Cir. 2007).). The hypothetical person of skill is also separately presumed to have knowledge of all the relevant prior art in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 693, 697 (Fed. Cir. 1983).

B. Definition of a Person of Ordinary Skill in the Art

For this Investigation, a person of ordinary skill in the art would have had:

> either: (1) at least a bachelor's degree in chemical or mechanical engineering, chemistry, biochemistry, or similar science or engineering studies with at least one year of post-graduate or industry work experience in liquid filtration systems (or in a similar field), or (2) at least five years of industry work experience in liquid filtration systems (or in a similar field).

(*Markman* Order at 7.).[21]

The differences among the proposed definitions by Brita and Respondents were not dispositive and had little, if any, effect on the claim construction analysis set forth in the

[21] As explained in the *Markman* Order:

> Brita proposed that as of the priority dates of the '141 patent, a person of ordinary skill in the art would have had:
>
> > a bachelor's degree (or equivalent) in chemical engineering, chemistry, or sanitary engineering (or a similar field) and either a Ph.D. (or equivalent) in chemical engineering, chemistry, or sanitary engineering (or a similar field) or at least three years of experience working with liquid filtration systems (or in a similar field); or (ii) at least seven years of experience working with liquid filtration systems (or in a similar field).
>
> (CMBr. at 7.).
>
> Respondents' *Markman* brief failed to propose a definition of a person of ordinary skill in the art. However, Brita understands that Respondents' proposed a person of ordinary skill in the art would have had either: (1) at least a bachelor's degree in chemical or mechanical engineering, chemistry, biochemistry, or similar science or engineering studies with at least one year of post-graduate or industry work experience in filtering technologies, or (2) at least five years of industry work experience in filtering technologies. (*Id*. at 8.).
>
> The Parties' definitions have slight differences in the subject areas of the bachelor's degree or the amount of work experience needed. Brita's definition requires experience with liquid filtration systems, while Respondents' definition describes filtration in general, rather than liquid filtration. A combination of the two definitions was adopted as capturing the level of skill required of a person of ordinary skill of art, that of a combination of education and experience, or many years of experience in the industry.

(*Markman* Order at 6-7.).

Markman Order.

VIII. NSF/ANSI 53 STANDARD

A. Background

The purpose of NSF/ANSI 53 was "to establish minimum requirements for materials, design and construction, and performance of drinking water treatment systems that are designed to reduce specific health-related contaminants in public or private water supplies." (CX-0010.0009.).[22] Among the health-related contaminants are lead. (CX-0010.0080.). The NSF/ANSI 53 standard in effect at the time of the '141 patent is the 2007 revision ("NSF/ANSI 53 (2007)" or "NSF/ANSI 53").[23] (*See* JX-0022 at 26:22-29.). The 2007 revision was in large part created to update the existing test for reduction of lead at pH 8.5. (CX-0010.0009, 0080.).

As Brita noted, lead in drinking water exists in two (2) forms. (CBr. at 7.). Respondents' expert, Mr. Herman, explained that lead may be dissolved in water, i.e., soluble lead, or it may be solid particles suspended in water, i.e., colloidal, particulate, or insoluble lead. (Tr. (Herman) at 1015:16-1016:4, 1017:4-14.). The '141 patent and the NSF/ANSI 53 standard both define colloidal/particulate/insoluble lead as lead particles having a diameter of 0.1 µm or greater. (JX-0022 at 10:46-48; CX-0010.0080 n.5; Tr. (Herman) at 1015:23-1016:4.). Within the class of colloidal/particulate/insoluble lead is a subclass referred to as fine particulate lead or fines. (*See*

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[22] CX-0010 is the NSF/ANSI 53 (2007) standard.

[23] During the *Markman* proceedings, Respondents argued that "[t]he NSF/ANSI 53 standard has undergone several major changes since the alleged date of invention in May 2006" and that "[i]t is improper to have a term that means different things at different times." (RMBr. at 13 (citation omitted).). However, the *Markman* Order rejected Respondents' argument and clearly articulated that "the standard incorporated by reference with sufficient particularity at the time the invention was made does ***not*** change with time. In other words, the 2007 NSF/ANSI standard does ***not*** change with time." (*Markman* Order at 18 (emphasis added).). To be clear, the version of the NSF/ANSI 53 standard that the '141 patent incorporated by reference is the 2007 version.

CX-0010.080.). Fine particulate lead or fines is defined as lead particles between 0.1 µm and 1.2 µm. (*Id.* at n.5; Tr. (Herman) at 1206:17-1207:2.). The remainder of the total lead that is not particulate lead of 0.1 µm or greater, that is lead of less than 0.1 µm, is defined as soluble lead. (JX-0022 at 10:48-50; Tr. (Rick Nishijima)[24] at 320:18-321:6 (explaining that measuring the lead after filtering out all particles of 0.1 µm or greater provides the soluble lead value); Tr. (Herman) at 1148:3-11 (calculating soluble lead by subtracting particulate lead from total lead).).

The NSF/ANSI 53 standard contains certification tests for lead at both pH 6.5 and pH 8.5. (CX-0010.0080.). As disclosed in the patent, the ’141 patent is primarily concerned with the testing parameters associated with the pH 8.5. (*See, e.g.*, JX-0022 at cl. 1 (reciting a pH of 8.5), Abstract, 5:48-51, 5:54-60, 12:23-26, 25:46-51.). The NSF/ANSI 53 test for pH 8.5 lead requires that challenge water, which is the water tested with each filter, to be prepared according to a specific method and that the resultant water have certain properties, including certain amounts of lead. (CX-0010.0080, 0083-85.). The challenge water is then passed through the filter, and the filtered water is analyzed to determine whether the filter sufficiently reduces lead under the standard. (*See, e.g.*, CBr. at 8.).

In versions of the standard that pre-date the 2007 version of the NSF/ANSI 53, there was no express particulate or fine particulate lead requirement for the challenge water. (Tr. (Herman) at 1016:8-19 (explaining the state of the industry before 2007).). The 2007 revision of NSF/ANSI 53 established minimum amounts of both total particulate lead (i.e., above 0.1 µm in

[24] When he testified during the Hearing on August 18, 2022, Mr. Rick Nishijima was an Associate Research Fellow at The Clorox Company. (CPSt. at 2.). Mr. Nishijima testified that he had been with The Clorox Company for approximately 26 years and worked in the Brita research and development division for 24.5 of those years. (Tr. (Nishijima) at 301:20-302:5.). Brita identified Mr. Nishijima as a fact witness to testify about: (i) the testing conducted related to infringement and the validity of the ’141 patent; and (ii) Brita’s laboratory practices and procedures, including laboratory notebooks. (CPSt. at 2.).

diameter) and fine particulate lead (i.e., between 0.1 µm and 1.2 µm in diameter). (CX-0010.0080.). Respondents' expert, Mr. Herman, was involved in drafting the 2007 revision and testified during the Hearing that the standards were "really concerned about particulates, so we have a specification on how much colloidal lead must be there, and then within that a percentage of it that must be fine." (Tr. (Herman) at 1017:15-18.).

The NSF/ANSI 53 (2007) standard required that the challenge water have a nominal value of 150 ppb (parts per billion)[25] of total lead, and that nominally 30% of that lead be particulate lead. (CX-0010.0080 at Table 14.). The 2007 standard permitted the particulate lead to vary by plus or minus 10% from the nominal 30% value, which would allow particulate lead to be between 30 and 60 ppb. (*Id.*). The NSF/ANSI 53 (2007) standard also required that at least 20% of the particulate lead be "fine" particulate lead (i.e., between 0.1 µm and 1.2 µm in diameter). (*Id.*). Additionally, the NSF/ANSI 53 (2007) standard specified certain other characteristics for the challenge water, such as pH, temperature, alkalinity, hardness, and chlorine. (*Id.* at 0083.).

B. The '141 Patent Does Not Require the NSF/ANSI 53 (2007) Standard

As an initial matter, neither party argued that the '141 patent ***requires*** the NSF/ANSI 53 (2007) standard. (CRBr. at 6-9; RBr. at 15-20; RRBr. at 3-5.). Indeed, Respondents repeatedly contended that the '141 patent is "not coextensive" with the NSF/ANSI 53 (2007) standard and does not require the NSF/ANSI 53 (2007) challenge water. (RBr. at 15-20; RRBr. at 3-5.). According to Respondents, "Brita incorrectly argue[d] that the '141 Patent requires aspects of the NSF 53 (2007) testing requirement, namely: (1) a narrower total lead for challenge water (135-

[25] One ppb is equal to one µg per liter. Thus, the units "ppb" and "µg/L" are used interchangeably. (*See, e.g.*, CBr. at 8 n.1.).

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165 ppm) than required by claim 1 (120-180 ppm); (2) a 20-40% particulate requirement; and (3) a minimum 20% fine particulate requirement within the testing water." (RRBr. at 3.).

With respect to the NSF/ANSI 53 (2007) standard's requirement of 135-165 ppb total lead in the affluent water, Respondents asserted that the '141 patent does not require the standard's "heightened" requirement, and that the range required by the '141 patent is 120-180 ppb. (RBr. at 16-17; RRBr. at 3-4.). In their Post-Hearing Reply Brief, Respondents stated that "Brita goes as far as to provide a comparison chart ***falsely representing*** that the '141 Patent ***requires*** these aspects of NSF 53 (2007) (shown in red circles below)[.]" (RRBr. at 3 (emphases added).). However, Respondents' assertions are belied by the evidence.

Figure No. 2: Respondents' False Representation of Brita's Chart

Parameter	'141 Patent	Brita SOP	NSF/ANSI 53 (2007)
Total Lead	**135-165 ppb (150 ppb nominal)** JX-0022.0043 (25:49-57)	RX-0432C at 2 Hearing Tr. at 306:19-23 (Nishijima)	**135-165 ppb (150 ppb nominal)** CX-0010.0080
Particulate Lead (greater than 0.1 µm)	**20-40%** JX-0022.0043 (25:50-59) **30-60 ppb** JX-0022.0047 (claim 1)	CX-0194C.0001; RX-0432C at 2 (20-40% of 150 ppb total lead)	**20-40%** CX-0010.0080 **30-60 ppb** (20-40% of 150 ppb total lead)
Fine Particulate Lead (0.1 µm to 1.2 µm)	**Greater than 20% of particulate lead** JX-0022.0043 (25:58-60)	CX-0194C.0001 RX-0432C at 2	**Greater than 20% of particulate lead** CX-0010.0080

(RRBr. at 3 (annotated by Respondents) (citing CBr. at 25).).

Respondents failed to note that what Brita was presenting in that chart, Figure No. 2 above, were "[r]elevant portions of the challenge water specifications from Brita's SOP, the '141 patent, and the NSF/ANSI 53 (2007) standard[.]" (CBr. at 25.). Nowhere in its Post-Hearing Brief did Brita claim that the total lead required by claim 1 of '141 patent is the same as that

required by the NSF/ANSI 53 (2007) standard. Furthermore, the portions of the ’141 patent specification to which Brita cited ***disclose amounts shown in Brita’s chart***. For example, with regard to the three (3) lead parameters listed in the Brita’s chart above, the ’141 patent discloses the following:

> The effluent lead concentration (c) is the amount of total lead (soluble and colloidal) remaining in the water after filtration for the last liter of water filtered in the defined filter lifetime when the influent (source) challenge water is pH 8.5 water containing 150±15 ppb of total lead with 30±10% being colloidal lead greater than 0.1 um in diameter.
>
> Preferably, the source water is prepared as defined in the NSF/ANSI 53 protocol (2007). Illustrative source water specifications according to the NSF/ANSI 53 protocol (2007) are as follows:
> ***135-165 ppb total lead content***
> ***20-40% of lead in colloidal form, size greater than 0.1 µm***
> ***greater than 20% of the colloidal lead must be in the 0.1 µm to 1.2 µm size range***.

(JX-0022 at 25:46-60 (emphases added).).

The referenced disclosures are consistent with Brita’s representations in its chart, Figure 2, above. That the amounts of total lead recited in claim 1 (90-120 ppb soluble lead + 30-60 ppb = 120-180 ppb) and particulate/colloidal lead (30-60 ppb) are not identical to the amounts specified in the ’141 patent and identified in the NSF/ANSI 53 (2007) standard do not supersede disclosures in the specification that match the standard’s ranges. Similarly, although claim 1 recites a broader standard for the particulate lead size (needing only it to be 0.1 µm), as quoted above, the specification of the ’141 patent discloses a range for particulate/colloidal lead (i.e., fine) that aligns squarely with the NSF/ANSI 53 (2007) standard. Thus, while the asserted claims do not require the NSF/ANSI 53 (2007) standard for each of these parameters, the ’141 patent clearly contemplates the inclusion of the relevant aspects of the NSF/ANSI 53 (2007) standard with respect to the lead levels in the challenge water.

IX. TESTING PROTOCOLS AND TESTED PRODUCTS

A. Brita's Accused Product Testing

Brita's fact witness, Mr. Nishijima, oversaw the testing conducted in this Investigation to determine the volume, lead effluent concentration, and average filtration unit time of each Accused and DI Product. (Tr. (Nishijima) at 302:25-303:9, 304:17-306:18.). Mr. Nishijima testified that the testing protocols Brita employed were based on industry standards and had been developed and validated over many years. (*Id.* at 302:3-24, 309:19-310:5.). He also confirmed that he reviewed the guidance disclosed in the '141 patent to ensure Brita's testing protocols complied with the '141 patent requirements. (*Id.* at 307:3-308:1.). As shown in the evidence that Brita provided, Mr. Nishijima and his colleagues documented their testing and results in, *inter alia*, photographs, videos, lab notebooks, laboratory procedures, and all collected measurements. (*See, e.g.*, CX-0121C (pouring protocol); CX-0910C (volume measurement method and data); CX-0911C (flow rate measurements); CX-0912C (lead effluent concentration measurements); RX-0432C (challenge water preparation method).).

Brita's expert, Dr. Rockstraw, also reviewed all the testing and documentation from Brita's testing and found no basis to conclude that the materials upon which Brita relied were inaccurate or unreliable. (*See, e.g.*, Tr. (Rockstraw) at 466:5-467:4, 477:3-20, 506:12-24.). During the Hearing, Dr. Rockstraw explained how the testing demonstrated that: (i) each Accused Product infringed the asserted claims; and (ii) each DI Product practiced the domestic industry claims. (*See id.* at 458:16-517:5.).

Respondents contended that Brita did not follow the NSF/ANSI 53 (2007) standard in Brita's testing of the Accused and DI Products. (RRBr. at 5.). However, much of Respondents' cross-examination of Mr. Nishijima focused on what appeared to be minor differences between

Brita's test procedures and an NSF/ANSI 53 certification test and/or isolated and inadvertent errors in collecting and recording data. (*See generally* Tr. (Nishijima) at 331:10-413:6, 420:18-424:20.). As Brita noted, absent from the record is any evidence that the testing Brita conducted did not comply with the requirements of the '141 patent or otherwise produced inaccurate or unreliable results. (CBr. at 21.).

For the reasons discussed below, Brita presented compelling evidence that its testing is accurate and reliable.

1. Volume Testing

Based on Mr. Nishijima's lab notebook (CX-0910C), Brita described the testing procedures for measuring volume as follows:

> To measure the volume of the filter media, the filter's housing was cut open, the filter media was removed from the filter, and filter media was placed it into a graduated cylinder for measurement. CX-0910C.0002, 0004. The exact method varied slightly depending on the form of the filter material.
>
> For mixed media filter media, the media was transferred into a graduated cylinder using a funnel. Water was used to flush any remaining media into the graduated cylinder. *Id.* at 0002. The flushing water was drained from the graduated cylinder, and fresh water was added until the water level just reached the top of the filter media. *Id.* The graduated cylinder was then vibrated to remove any air bubbles from within the media. *Id.* After the air was removed, a glass plunger was gently placed on top of the filter media to ensure no air was present in the upper portion of the media. *Id.* The volume was then read off the graduated cylinder. *Id.*
>
> For irregular shaped media, such as the pleated non-woven media in the Accused PUR Plus Products and the DI Products, Brita removed the media from the housing and removed as much glue and plastic as possible. CX-0910C.0004. The pleated media was then soaked in water for 30 minutes before being removed and excess water being pressed out. *Id.* The media was then placed in a graduated cylinder filled with a known amount of water. The media would be agitated to remove any air bubbles and the difference in volume after the media was added would be measured. *Id.* The volume of the pleated media would be the difference in the water level before and after the media was added. This method was also used for other irregular-shaped (i.e., non-granular) filter media such as the membrane filter and activated carbon/ion exchange resin "puck" of the Accused LifeStraw Home Filter. *Id.* at 0001. In the case of the membrane filter, it was measured with both

> the membranes and the plastic housing that holds the membranes. *Id.* The plastic housing was then removed and measured separately and this volume was subtracted from the previous measurement to determine the volume of the membrane filter media. *Id.*

(CBr. at 22-23.).

Brita stated that these methods were used to measure the filter media volume of each Accused and DI Product. (*Id.* at 23.). Brita also provided the following chart, Chart No. 8, that summarizes the results reported in Mr. Nishijima's lab notebook.

Chart No. 8: Results of Volume Testing[26]

Filter	Volume Measured (cm^3)
PUR Plus Filter (CX-0910C.0002-0003)	Granular Media: 135 cm^3 Glass Fiber Module: 20 cm^3 **Total: 155 cm^3**
ZeroWater Filter (CX-0910C.0002)	Granular Media: 550 cm^3 **Total: 550 cm^3**
LifeStraw Home Filter (CX-0910C.0001)	Hollow-Fiber Membrane: 50 cm^3 Activated Carbon/Ion Exchange Resin: 50 cm^3 **Total: 100 cm^3**
LongLast (CX-0910C.0004)	Pleated Media: 48 cm^3 **Total: 48 cm^3**
LongLast+ (CX-0910C.0004)	Pleated Media: 48 cm^3 **Total: 48 cm^3**

(CBr. at 23 (emphases in original).).

2. Challenge Water Preparation

Brita described the process of preparing challenge water,[27] in order to determine the lead

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[26] One mL is equal to one cubic centimeter. (*See, e.g.*, CBr. at 23.).

[27] *See also* Tr. (Nishijima) at 304:25-305:23.

> Q. So let's break that down. For the first one you mentioned you did testing with pH 8.5 lead challenge water. Did I get that right?
>
> A. Yes, that's correct.

effluent concentration and average filtration unit time required to ascertain the FRAP factor, as follows:

> To determine the lead effluent concentration and average filtration unit time required to determine the FRAP factor, challenge water was poured through a given filter. Hearing Tr. at 312:16-313:4, 317:4-19 (Nishijima). Challenge water is water having certain specified properties. *Id.* at 304:17-305:23 (Nishijima). For the '141 patent, the challenge water must have a pH of 8.5 and certain levels of soluble and particulate lead. JX-0022.0047, Claim 1. Each batch of challenge water should be substantially the same to permit consistent and accurate testing of different filters.
>
> In the case of pH 8.5 lead testing, the exact lead concentration parameters of the challenge water can have substantial impacts on the testing results and consistency. *See* Hearing Tr. at 1016:13-19 (Herman). Thus, having a well-defined method and consistent laboratory practices are crucial for preparing consistent and representative challenge water. *See* RX-1654 at NSF00000627 (NSF memorandum explaining that the challenge water preparation method "was complex and required strict adherence," and "the sensitivity of the method required additional levels of detail and monitoring to ensure each test met the requirements throughout the entire test").
>
> Because Brita has decades of experience designing and testing water filters, including for lead removal, Brita's internal laboratory has decades of experience preparing challenge water for lead pH 8.5 testing. Hearing Tr. at 309:19-310:5 (Nishijima). In fact, Brita's laboratory was one of several that were selected by NSF to prepare sample batches of challenge water as part of the development of the NSF/ANSI 53 (2007) standard. *Id.* at 328:12-329:1 (Nishijima).
>
> Thus, before this Investigation, Brita had already developed an internal standard operating procedure (SOP) for preparing pH 8.5 lead challenge water. *Id.* at 305:24-306:9 (Nishijima). This SOP was developed based on the NSF/ANSI 53

Q. Could you provide a very brief summary of what that test involves?

A. Yeah. It's a test where you take reverse osmosis deionized water, you add some typical minerals that are found in tap water, like calcium, magnesium, and other things that add alkalinity, and then once you have that base water characteristic made up, you also adjust the pH to that 8.5 range. Once you have those base water characteristics made up, you will add the lead solutions. You first add an insoluble -- sorry -- a soluble lead solution, and then you let that equilibrate for a while, and then you add an insoluble lead stock solution and let that mix, and then you check the tank for parameters.

Q. Thank you, Mr. Nishijima. I would actually like to go a level up. When we talk about using pH 8.5 lead challenge water, what are we using that water to do?

A. That water is used to check the filter performance for lead reduction.

> standard and Brita's decades of learnings from performing this type of testing. *Id.* at 306:10-14 (Nishijima). And the challenge water used to test the Accused and DI Products was based on this Brita SOP. *Id.* at 312:8-15 (Nishijima).

(CBr. at 23-24.).

Mr. Nishijima testified that he compared Brita's SOP to the requirements and teachings of the '141 patent and concluded that the specifications and requirements were similar. (Tr. (Nishijima) at 306:10-308:1.). He explained that the '141 patent's requirements and those of Brita's standards were similar because both were based on the NSF/ANSI 53 standard. (*Id.* at 306:10-14.). Thus, Mr. Nishijima testified that the challenge water created using Brita's SOP met the challenge water requirements disclosed in the '141 patent. (*Id.* at 307:15-308:1.).

Additionally, Mr. Nishijima confirmed that the base challenge water parameters (e.g., hardness and alkalinity) of Brita's SOP complied with the NSF/ANSI 53 standard. (*Id.* at 335:8-19.). Brita's SOP is summarized in RX-0432C, which describes the process for creating challenge water for the FRAP testing in this Investigation. (*See* RX-0432C.). Each tank of challenge water Brita prepared included an accompanying "bench sheet" that contained the specifications for the water and a field where technicians recorded measurements of the parameters to ensure the water was within those specifications. (CX-0194C; Tr. (Nishijima) at 310:9-311:3.).

Brita provided the following chart, Chart No. 9, that compares relevant portions of the challenge water specifications from Brita's SOP, the '141 patent, and the NSF/ANSI 53 (2007) standard.

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Chart No. 9: Comparison of Challenge Water Specifications from Brita's SOP, the '141 Patent, and the NSF/ANSI 53 (2007) Standard

Parameter	'141 Patent	Brita SOP	NSF/ANSI 53 (2007)
Total Lead	**135-165 ppb (150 ppb nominal)** JX-0022.0043 (25:49-57)	[redacted] RX-0432C at 2 Hearing Tr. at 306:19-23 (Nishijima)	**135-165 ppb (150 ppb nominal)** CX-0010.0080
Particulate Lead (greater than 0.1 µm)	**20-40%** JX-0022.0043 (25:50-59) **30-60 ppb** JX-0022.0047 (claim 1)	[redacted] CX-0194C.0001; RX-0432C at 2 [redacted] (20-40% of 150 ppb total lead)	**20-40%** CX-0010.0080 **30-60 ppb** (20-40% of 150 ppb total lead)
Fine Particulate Lead (0.1 µm to 1.2 µm)	**Greater than 20% of particulate lead** JX-0022.0043 (25:58-60)	[redacted] CX-0194C.0001 RX-0432C at 2	**Greater than 20% of particulate lead** CX-0010.0080
Soluble Lead	**90-120 ppb** JX-0022.0047 (claim 1)	[redacted]	**90-120 ppb** (60-80% of 150 ppb total lead) Implicitly set as remainder from total lead after subtracting particulate lead
pH	**8.3-8.6 (8.5 nominal)** JX-0022.0043 (25:49-26:5), 0047 (claim 1)	[redacted] CX-0194C.0001	**8.3-8.6 (8.5 nominal)** CX-0010.0083
Hardness	**90-110 mg/L** JX-0022.0043 (25:49-26:5)	[redacted] CX-0194.0001	**90-110 mg/L** CX-0010.0083
Alkalinity	**90-110 mg/L** JX-0022.0043 (25:49-26:5)	[redacted] CX-0194.0001	**90-110 mg/L** CX-0010.0083

(CBr. at 25-26 (emphases in original).).

As Brita pointed out, and as shown in Chart No. 9 above, Brita's SOP either matches the

specifications in the NSF/ANSI 53 (2007) standard and the ’141 patent or sets a narrower and more stringent target within the range allowed by the NSF/ANSI 53 (2007) standard and the ’141 patent requirements. (*Id.* at 26.).

Mr. Nishijima explained that each tank of challenge water took approximately [redacted] to prepare. (Tr. (Nishijima) at 309:15-18.). Additionally, Mr. Herman testified that the lead levels within a tank of challenge water are prone to change over time as some particulate lead dissolves or as soluble lead precipitates into particulate lead. (Tr. (Herman) at 1103:10-1104:20.). Thus, Brita provided evidence that it discarded any remaining challenge water and prepared a new batch at least every [redacted]. (RX-0432C at BRITALP-0033014-15 (scheduling the preparation of a new tank of challenge water on the [redacted] day (Thursday)).).

Mr. Nishijima summarized the process used to prepare the challenge water at Brita. He explained that: [redacted] (Tr. (Nishijima) at 305:6-7, 308:6-8); [redacted] (*id.* at 305:7-10, 308:8-10; CX-0194C.0001); [redacted] (Tr. (Nishijima) at 305:12-14; 308:11-13; CX-0194.0001); [redacted] (Tr. (Nishijima) at 305:14-17); and [redacted] (*id.* at 305:16-17, 308:19-24). He explained that if the challenge water tank was outside claim 1’s requirements for soluble and colloidal lead, it would either be corrected, or if that was not possible, discarded. (*Id.* at 311:11-20.). Otherwise, it would then be put into service and used for testing the filters. (*Id.* at 312:16-23.).

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3. Lead Effluent Measurements

The procedure for conducting the challenge water testing is summarized in a Brita standard operating procedure. (CX-0121C; Tr. (Nishijima) at 313:13-18.). Based on the SOP (CX-0121C), Mr. Nishijima's testimony, and the NSF/ANSI 53 (2007) standard (CX-0010), Brita described the process as follows:

> Brita's technicians would measure 1000 mL of challenge water into a graduated cylinder and hand pour that water into the reservoir of a pitcher system to be filtered. *Id.* at 312:24-313:4 (Nishijima).
>
> The challenge water was added one liter at a time to the filters. CX-0121C.0001. Each tested Accused and DI Product filter had a lifetime that it had been certified for under the NSF/ANSI 53 lead standard and which was identified to consumers. Hearing Tr. at 316:21-317:3 (Nishijima). Brita's procedure was to take samples of the challenge water entering the filter (known as influent) and samples of filtered water exiting the filter (known as effluent) in the first liter and then at 25%, 50%, 75%, and 100% of the filter's rated lifetime. CX-0121C.0002; Hearing Tr. at 317:11-23 (Nishijima). These samples were analyzed using an [redacted] *Id.* at 317:24-318:2 (Nishijima). Mr. Nishijima explained that [redacted] *Id.* at 318:3-7 (Nishijima); CX-0010.0080 (requiring [redacted]). The influent and effluent measurements, as well as the [redacted] were exported from the machine and reported in CX-0912C. Hearing Tr. at 318:8-17 (Nishijima).
>
> The influent samples were measured for total lead, total soluble lead (less than 0.1 μm), particulate and soluble lead smaller than 0.45 μm, and particulate and soluble lead smaller than 1.2 μm. *Id.* at 319:19-321:12 (Nishijima); CX-0912C (reporting lead concentration measurements); CX-0121C.0002 (explaining sampling and analysis procedure for lead influent and effluent). The 0.1 μm, 0.45 μm, and 1.2 μm measurements are obtained by passing a sample of influent challenge water through a filter with openings of these sizes. Hearing Tr. at 320:3-10 (Nishijima); CX-0121C.0002. Water that passes through these filters will not contain any lead particles greater than the opening size of the filter. Thus, the measured lead concentrations for these samples will reflect the concentration of lead (soluble and/or particulate) smaller than the respective filter opening size. Hearing Tr. at 320:11-321:6 (Nishijima).

(CBr. at 27-29.).

Mr. Nishijima explained that the information contained in CX-0912C reports total lead

(via the "total" measurements) and soluble lead (via the "0.1 µm" measurements). (Tr. (Nishijima) at 320:11-321:6; CX-0921C (lead measurements).). He testified that from these measurements, the total particulate lead and fine particulate lead could be calculated. (Tr. (Nishijima) at 320:18-24 ("Q. Okay. And just -- I think it would be helpful for Her Honor to see, so that gets the total lead that went in. If we want to know the fraction of lead that is insoluble in this particular pour, how would we do the math? A. So you would subtract the 0.1 micron value from the total value."),[28] 320:25-321:12.).

As indicated in the NSF/ANSI 53 (2007) standard, fine particulate lead is lead between 0.1 µm and 1.2 µm. (CX-0010.0080 n.5; *see also* Tr. (Herman) at 1206:17-1207:2.). Mr. Nishijima explained that the fine particulate lead can be determined by subtracting the soluble lead (identified as Influent 0.1 µm measurements in CX-0912C) from the soluble and particulate lead smaller than 1.2 µm (identified as Influent 1.2 µm measurements in CX-0912C). (Tr. (Nishijima) at 347:11-349:1; *see also* RDX-0013C.0008 (explaining the calculation of fine particulate lead).). As Brita pointed out, because soluble lead is lead that is less than 0.1 µm, this subtraction provides the amount of lead between 0.1 µm and 1.2 µm, which is defined as "[fine] particulate lead." (CBr. at 29; CX-0010.0080 n.5.). Mr. Nishijima testified that the percentage of fine particulate lead can then be calculated by dividing the fine particulate lead concentration by the total particulate lead concentration. (Tr. (Nishijima) at 348:18-23; *see also* RDX-0013C.0008).). Brita provided a summary of the lead concentration data recorded in CX-0912C, including the total lead concentration for the effluent samples and the total lead, soluble lead, total particulate lead, fine particulate. (*See* CBr. at App. A.).

[28] In other words, total particulate lead is calculated by subtracting the 0.1 µm measurement (which corresponds to soluble lead) from the total lead measurement.

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The data in CX-0912C and Appendix A demonstrates that each sample point Brita relied upon met Brita's SOP for total lead and total particulate lead. (CX-012C; CBr. at App. A.). Additionally, every sample point was within claim 1's limitations of 90-120 ppb soluble lead and 30-60 ppb particulate lead. (CX-0912C; CBr. at App. A.).

4. Average Filtration Unit Time Measurements

Brita tested the average filtration unit time for the Accused and DI Products. The '141 patent defines this parameter (also referred to as flow rate) as "the time it takes to filter one liter of water averaged over all filtered liters in the defined filter lifetime." (JX-0022 at 25:41-43.). According to Brita, it conducted this testing during the challenge water testing, which is described above in Section IX(A)(2) and Brita's SOP (CX-0121C). (CBr. at 30.). Brita described the testing process as follows:

> Technicians would add a liter of water to the reservoir of a filter system and start a timer. *Id.* at 313:5-12 (Nishijima). The timer would run until the last of the liter of water entered into the filter. *Id.* at 313:5-12 (Nishijima). The technicians recorded these times for every liter in the filter's lifetime (approximately 76 L for ZeroWater, 152 L for PUR Plus and LifeStraw Home, and 455 L for the DI Products). These recorded times are provided at CX-0911C. Hearing Tr. at 313:19-315:4 (Nishijima).
>
> Once the time it took to filter each liter in the filter's lifetime had been measured, Dr. Rockstraw summed the measurements and then divided the sum by the number of filter liters to return an average filtration unit time. *Id.* at 475:13-19 (Rockstraw).

(CBr. at 29-30.).

Brita noted that while it attempted to measure the time to filter every liter of water, a small number of such measurements were "missed." (CBr. at 30 (citing Tr. (Nishijima) at 316:2-14).). Mr. Nishijima explained that in these cases, the measurement was omitted and notated on CX-0911C as "missed."

> Q. . . . Do you see the entry where there's text written, Mr. Nishijima?
>
> A. Yes.

> Q. And what does that say?
>
> A. That says "missed."
>
> Q. And what does that mean?
>
> A. So as we're doing these timings, there may be a time where we have not caught the time frame of when the last bit of water entered the filter. So we're being transparent and just said that we missed that flow time.

(Tr. (Nishijima) at 316:2-11; *see also* CX-0911C.).

Mr. Nishijima also pointed out that in a limited number of instances, the technician did not empty the previously filtered liter of water (which would be sitting in the reservoir below the filter) before adding the next liter. (Tr. (Nishijima) at 415:8-22.). He explained that Brita's practice was to discard the flow rate measurement for that liter of water. (*Id.* at 415:23-416:5.). He confirmed that instances where this occurred were notated on CX-0911C as "2-fills" or "Double." (*Id.*; *see, e.g.*, CX-0911C.0005.).

Additionally, Dr. Rockstraw noted one instance where there was a timing error. (Tr. (Rockstraw) at 587:2-14.). He confirmed that this was notated on CX-0911C as "timer error." (*Id.*; CX-0911C.0001.).

Brita provided the following chart, Chart No. 10, summarizing the number of liters that Brita was able to measure (i.e., where there was not a "missed," "2-fill/Double," or "timer" error):

Chart No. 10: Summary of Average Filtration Unit Time Measurements for the Accused and DI Products

Product	Liters Filtered	Percent of Liters Filtered
Accused PUR Plus Filters	**146 of 152 liters** CX-0911C; CDX-0008C.25	96%
Accused ZeroWater Filters	**72 of 76 liters** CX-0911C; CDX-0008C.49	95%
Accused LifeStraw Home Filters	**145 of 152 liters** CX-0911C; CDX-0008C.94	95.4%
LongLast Filter	**454 of 455 liters** CX-0911C; CDX-0008C.116	99.8%
LongLast+ Filter	**453 of 455 liters** CX-0911C; CDX-0008C.116	99.6%

(CBr. at 31 (emphases in original).).

In addition, Brita stated that there were a limited number of instances where a filter would cease to pass water through or it would pass water at an extremely slow rate. (CBr. at 32.). Mr. Nishijima testified that in these instances, Brita's technicians would lift the pitcher and tap it on the tabletop to dislodge air bubbles and permit the filter to resume passing water at a normal flow rate. (Tr. (Nishijima) at 315:6-24.). He confirmed that instances where the filter was tapped were notated on CX-0911C with an asterisk. (*Id.*; CX-0911C.0002.).

During the Hearing, Respondents appeared to suggest that Brita's testing was unreliable because a small number of liters were not measured. (*See, e.g.*, Tr. (Nishijima) at 374:20-375:23.). However, Respondents did not offer expert rebuttal opinions to support their argument. (RPBr. at 35 (noting that Brita "skipped" data points for **f** but generally describing them as a "deficiency"); RRBr. at 10 (noting "missed" measurements).).

Additionally, Dr. Rockstraw testified that he reviewed Mr. Nishijima's flow rate data and was satisfied that measuring 95% of all filtered liters resulted in a statistically significant sample, and that the missed liters did not prevent him from calculating an accurate average filtration unit time for the Accused and DI Products. (Tr. (Rockstraw) at 477:3-20, 492:2-15, 506:8-24,

512:18-24.).

As indicated in Brita's SOP, Brita's standard testing procedure for passing water through the filters called for passing [redacted] per day. (CX-0121C.0001.). On this issue, during the Hearing, Respondents seemed to imply that Brita's testing was unreliable based on two instances where 13 liters were passed through rather than [redacted]. (Tr. (Nishijima) at 373:11-374:17.). However, because this argument was not raised in Respondents' Pre-Hearing Brief, Respondents abandoned or withdrew any argument on this issue under Ground Rule 7.2. (*See generally* RPBr. at 29-42.).[29] Moreover, as Brita pointed out, neither filter that had more than [redacted] passed through in one day is accused in this Investigation. (Tr. (Nishijima) at 373:11-374:17 (discussing PUR Standard and Aqua Crest LongLast replacement filters).). In other words, Brita's testing followed its SOP. Respondents' arguments about Brita's testing deficiencies were largely makeweight.

B. Respondents' Prior Art Product Testing

In order to demonstrate that the PUR 1-Stage, Brita Legacy Granular, and Dupont WF-PTC 100 prior art filters practice the claims of the '141 patent, Respondents' expert, Mr. Herman, engaged two (2) testing facilities to perform lead reduction testing on multiple samples of these three prior art filters. (Tr. (Herman) at 1011:22-1012:15, 1053:4-1054:1, 1059:20-1060:17; RDX-0007C.0029 (showing testing performed at Helen of Troy and Quality Filter Testing).).

Mr. Herman testified that one set of testing was conducted at Quality Filter Testing

[29] This argument was raised for the first time in Respondents' Post-Hearing Brief. (*See* RBr. at 69 n.10).).

("QFT"), which he described as being an IAPMO[30] certified lab who conducts filter testing and specifically, performs lead pH 8.5 tests. (Tr. (Herman) at 1053:4-1054:1, 1059:20-1060:17; RDX-0007C.0029.). Messrs. Herman and Michael Mitchell[31] both confirmed that QFT was not informed about this Investigation or the goal of the testing. (Tr. (Herman) at 1053:15-1054:1; Tr. (Mitchell) at 782:18-783:4 (going to the issue of potential bias.). Mr. Herman testified that the other testing was performed at Helen of Troy's laboratory ("Helen of Troy") by Mr. Mitchell and staff. (Tr. (Herman) at 1053:4-1054:1, 1059:20-1060:17; RDX-0007C.0029.).

During the Hearing, Mr. Herman and Mr. Mitchell provided descriptions of the testing conducted at Helen of Troy and QFT. (Tr. (Herman) at 1053:4-1061:22; Tr. (Mitchell) at 772:11-780:23.).[32] Mr. Herman provided the following overview of the testing protocol:

> Q. Give a brief overview as to how both Helen of Troy labs and Quality Filter Testing labs tested the prior art filters for flow rate and effluent lead for the FRAP equation.
>
> A. . . . [E]ssentially, they would prepare the influent challenge in a carbol large enough to be able to feed their tests that they were going to do that day. They were prepared according to the procedures that we had outlined, performed tests on it to make sure it was meeting specification.
>
> They would pour that influent in 1 liter allotments into the upper receiving trays of the filter apparatus. It would pass through the filter, and then they would collect the effluents, measure, verify that they had the correct amounts.
>
> And then also at sample points they would be sampling the effluent to determine whether or not -- or actually measure the amount of lead in the effluent.
>
> For the actual filter rate testing at each one of those sample points, they would put

---

[30] IAPMO is an acronym for International Association of Plumbing and Mechanical Officials. (Tr. (Herman) at 1053:19-23.).

[31] At the time of his deposition on May 11, 2022, Mr. Michael Mitchell was Director of Advanced Technologies at Respondent Helen of Troy. (RPSt. at 5; CX-0696C (Mitchell Dep. Tr.) at 12:10-13:3.).

[32] The underlying results from the testing at Helen of Troy can be found at RX-0709C, RX-0710C, and RX-0986C. The underlying results from the testing at QFT can be found at RX-0684C through RX-0707C.

> 1 liter into the vessel and start a stopwatch. And then when the vessel had emptied, they would stop the stopwatch, and that would be their time for treatment for 1 liter.

(Tr. (Herman) at 1059:20-1060:17; *see also* RX-0986; RX-0684.).

Similarly, Mr. Mitchell explained that the testing was conducted as follows:

> Q. Okay. Can I ask you to give a 30,000 foot overview? I realize there's a lot more steps involved --
>
> A. Yeah.
>
> Q. -- how you tested prior art filters?
>
> A. Yeah, absolutely. So it starts in the morning. So the engineers and the technicians, we make the tank of water towards that -- to that SOP that earlier was based on that '141 claim.
>
> And so they add the right salts, the add the lead, they do the stirring. They take a sample and they run it through the ICPOES. If it meets the requirement of that first claim, then we start testing one liter at a time through those filters. If it doesn't, they basically either dilute that tank or they add more lead to that tank. They retest it, make sure it's in spec, and then they start doing the testing through the filter.
>
> Q. Thank you, Mr. Mitchell. You talk about the lead challenge water. How often did you test that lead challenge water?
>
> A. So, again, we wanted to make sure that it was right before we used it. So every day the influent concentration gets tested. We make sure it's in spec before it's used. So it is tested every day.
>
> Q. And --
>
> A. It was tested every day.
>
> Q. Thank you, Mr. Mitchell. How often did you test the effluent lead through these filters?
>
> A. That was five times during the test and then once at the end.
>
> Q. Was that five times after certain volumes were run through?
>
> A. Yep.
>
> Q. And how much challenge water, if you will, were added the day to these filters?
>
> A. Typically around two gallons per day we ran.

(Tr. (Mitchell) at 772:15-773:24; *see also* RX-0709C; RX-0710C.).

Brita asserted that Respondents' "litigation-generated protocol" was not a standard protocol for pH 8.5 lead challenge water. (CRBr. at 11-12 (citing Tr. (Mitchell) at 788:10-790:5).).

As an initial matter, Mr. Mitchell confirmed that the protocol Respondents used was created for purposes of this Investigation.

> Q. Is that a standard operating procedure for anytime you do a lead challenge at Helen of Troy or just when you're doing it for purposes of the '141 patent?
>
> A. This procedure was put together for the '141.
>
> Q. Okay. So this isn't the tank water specification that you use normally for challenging with pH 8.5 lead, right?
>
> A. No.

(Tr. (Mitchell) at 789:8-15.).

Moreover, Mr. Herman testified that he did not know who selected the parameters used in the protocol or why certain parameters were chosen. (Tr. (Herman) at 1168:17-21 ("Q. And you don't know why it was chosen, do you? A. Specifically what was the exact thought process, no, I don't. Q. And you don't know who chose it, do you? A. No.").).

As Brita noted, rather than follow what a person of skill in the art would do, that is to look to the guidance provided in the specification of the '141 patent and industry standards for making reliable, stable challenge water, Respondents tested water filters with challenge water that did not include fine particulate lead, which Mr. Herman confirmed would result in "extreme variability." (CRBr. at 11 (citing Tr. (Herman) at 1204:11-1208:12).). He defended the decision to leave out fine particulate lead on the basis that the claims of the '141 patent do not require a strict application of all parameters of the NSF/ANSI 53 (2007) protocol.

> Q. Okay. And even though you knew that, by leaving out specifications for fine

particulate, it could lead to extreme variability in the tests, you didn't include that in your challenge water specifications for this investigation, right?

A. Right, because I was trying to reflect what was in the '141 patent, and, from my point of view, that means if it ends up having a wide variation because of fines, that's inherent within the patent specification.

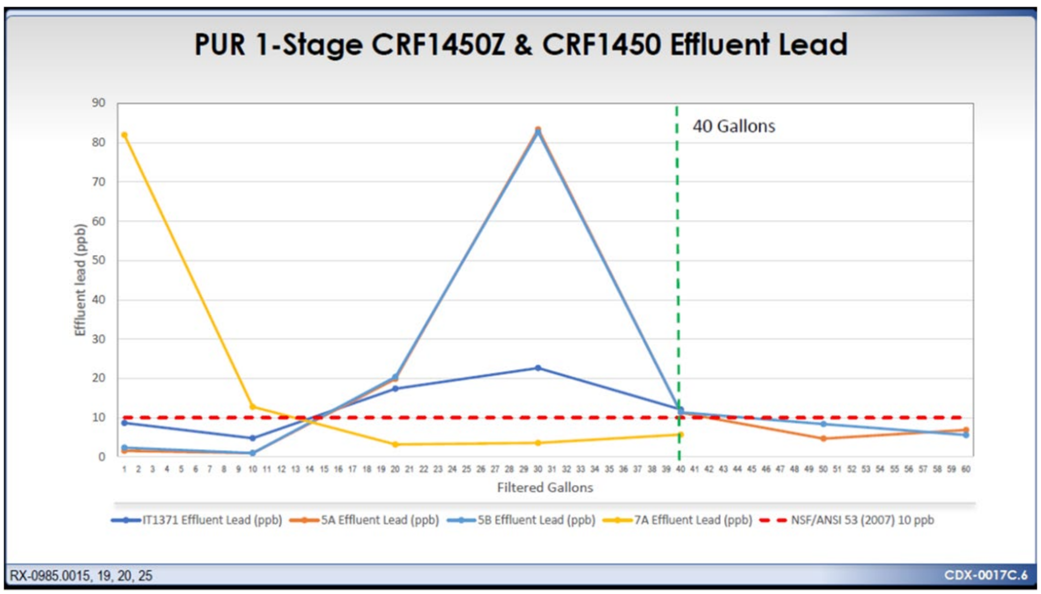
Q. So you didn't -- when you read the '141 patent, you didn't see it telling you to control for fine particulates in the challenge water for claim 1; is that your testimony?

A. Yes, it doesn't indicate that you have to control fines.

(Tr. (Herman) at 1204:11-25; *see also id.* at 1202:5-11.).

The problem with Mr. Herman's challenge water is demonstrated by the variability of his test results. For example, the results for PUR 1-Stage filters are shown below in Figure No. 3.

Figure No. 3: PUR 1-Stage Effluent Lead Results



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Filter #5A PUR 1450Z White - Sample A Data Summary Table

Sample Point	Accumulated Volume Effluent 1 (gal)	Influent 1 Lead (120 - 140 µg/L)	Effluent 1 Lead Concentration (µg/L)	Influent 1 Soluble Lead (90 - 120 µg/L)	Influent 1 Colloidal Lead (30 - 60 µg/L)
10 UV	Start	131.6	1.6	94.1	37.5
25%	10	124.4	1.0	88.8	35.6
50%	20	138.3	19.9	102.4	35.9
75%	30	138.4	83.4	92.5	45.9
100%	40	130.2	11.3	93.8	36.4
125%	50	138.0	4.7	95.5	42.5
150%	60	137.2	6.9	93.9	43.3

Filter #5B PUR 1450Z White - Sample B Data Summary Table

10 UV	Start	131.6	2.4	94.1	37.5
25%	10	124.4	1.0	88.8	35.6
50%	20	138.3	20.4	102.4	35.9
75%	30	138.4	82.7	92.5	45.9
100%	40	130.2	11.4	93.8	36.4
125%	50	138.0	8.4	95.5	42.5
150%	60	137.2	5.6	93.9	43.3

(CDX-0017C.0006 (PUR 1-Stage graph) (citing RX-0985.0015, 0019, 0020, 0025), 0010 (PUR 1-Stage data table) (citing RX-0985.0015, 0019).).

As shown above in Figure No. 3, Sample 5A reported effluent lead concentrations between 1 ppb and 83.4 ppb within the first 40 gallons. (CDX-0017C.0010; RX-0985.0015.). As Brita pointed out, that is approximately an 8,300% difference in lead concentrations for the same filter during the same test. (CRBr. at 12.). Additionally, of the four different filters tested, only two of the filters (5A and 5B) had similar results. (CDX-0017C.0006.). Despite having followed the same protocol, the other two (IT1371 and 7A) resulted in noticeably different results at almost every sample point. (*Id.*).

During his cross-examination, Mr. Herman acknowledged that he followed ***all*** the other requirements for making challenge water under NSF/ANSI 53 (2007), but he chose ***not*** to follow the requirements for fine particulate lead.

> Q. Okay. Now does the protocol that you had – I'm sorry. I say you followed, but you know when I say you followed, I mean the people working under your direction. That protocol had specifications for alkalinity, right?
>
> A. Yes, it has specifications and ranges for alkalinity.

Q. And claim 1 of the ’141 patent doesn’t have any specifications or requirements for alkalinity, correct?

A. Nope.

Q. And you also included specifications for hardness, correct?

A. Mm-hmm, yes, I did.

Q. And you agree with me, claim 1 does not recite a requirement for the hardness of the challenge water, correct?

A. No, it does not.

* * *

Q. And you would agree that you set specifications for the challenge water for its temperature, correct?

A. Yes, I did.

Q. And those – there’s no requirement in claim 1 as to the temperature of the challenge water, right?

A. No, there is not.

Q. Okay. You also provided for adding a certain amount of calcium chloride to ensure you had the right amount of chlorine in the testing water, correct?

A. Actually, that wouldn’t be calcium chloride. That’s for hardness. For chlorine, we would [sic] actually had sodium hypochlorite.

* * *

Q. And you did -- for each of those parameters that we just talked through -- alkalinity, hardness, temperature, chlorine -- none were in the ’141 patent, but you knew to include them because that’s how you make challenge water under the industry standard, right?

A. That’s -- if you want to make particulate, you’re going to have to have those constituents; otherwise, you won’t make particulate.

* * *

Q. Your specifications were consistent with the NSF specification for NSF 53 2007, correct?

A. I believe the ranges overlapped.

Q. Okay. And you followed the temperature range for NSF 53 2007, right?

A. Yeah. That's normal.

Q. And you followed the constituent components for the challenge water, including calcium chloride dihydrate, magnesium sulfate, sodium bicarbonate, sodium hydroxide, you followed all those, correct?

A. Yeah, the chemical constituents of the test water were followed so that we could make particulate lead.

Q. And the ***one*** thing you did ***not*** follow, the one thing you said would lead to extreme variability in the challenge water, was the guidelines on fine lead particulates, correct?

A. That fine particulates was ***not*** included in the specification because ***we did not see it as a requirement to perform FRAP testing under the '141 patent***.

Q. You didn't think it was important to have challenge water that did not have extreme variability in it.

A. ***I thought it was important to demonstrate the inherent variability of the '141 patent by not having a specific specification requirement for fine particulate lead***.

(Tr. (Herman) at 1202:12-1203:4, 1203:8-19, 1204:10, 1207:19-1208:18 (emphases added); *see also* CDX-0017C.0021).).

As reflected in his testimony above, Mr. Herman provided two (2) main reasons for deciding to exclude controls for fine particulate lead: (i) he believed that there was no such requirement in the '141 patent; and (ii) he thought "it was important to demonstrate the inherent variability of the '141 patent." (*Id.*). Neither reason adequately justifies the exclusion, especially in light of his earlier testimony about the NSF/ANSI 53 standard (2007) and the importance of fine particulate lead in pH 8.5 challenge water in order to ***control*** particulate formation and ***avoid*** variability.

Q. Now with respect to fine particulate, the standard is under NSF 2007 -- sorry -- NSF 53 2007, that you want to have at least 20 percent of your particulate is between .1 and 1.2 microns. Do I have that right?

A. Yes. Yes, that is a minimum specification.

Q. And in your view that's a ***critical part*** of the NSF 53 2007 pH 8.5 challenge

> water specification, correct?
>
> A. ***Yes, because when you actually are obtaining at least 20 percent, then you're controlling the particulate formation and any agglomeration of particulates within the test water.***
>
> Q. And if you are not properly controlling for fine particulate, you can have extreme variability in pH 8.5 lead challenge water, do you agree with that?
>
> A. Sure. ***If you just throw it together and don't control fines, then, yes, you could have significant variance***.

(*Id.* at 1201:12-1202:4 (emphases added).).

Thus, Mr. Herman's inconsistent testimonies severely undermine the credibility of his decision to not control the fine particulates in Respondents' testing.

Moreover, Mr. Herman and Respondents' defense of their testing based on the absence of an explicit requirement in claim 1 for fine particulate lead is not compelling. The specification of the '141 patent discloses that "[p]referably, the source water is prepared ***as defined in the NSF/ASNI 53 protocol (2007)***" and that "greater than 20% of the colloidal lead must be in the 0.1 µm to 1.2 µm size range." (JX-0022 at 25:53-60 (emphasis added).).

Given this disclosure and other teachings in the specification, one of ordinary skill would follow NSF/ANSI 53 (2007)—and certainly not disregard it—when preparing challenge water in accordance with claim 1. (*See* JX-0022 at 23:26-32, 25:46-26:5, 26:22-29; *see also Markman* Order at 27 (noting that "as the '141 patent explains and a skilled artisan would readily understand, the flow rate being measured is the flow rate of water during lead reduction testing pursuant to NSF/ANSI 53").). *See also Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) ("The claims . . . do not stand alone. Rather, they are part of 'a fully integrated written instrument,' consisting principally of a specification that concludes with the claims. For that reason, claims 'must be read in view of the specification, of which they are a part.'").). Mr. Herman was aware of these teachings but acknowledged that he "didn't test according to the

specifications requiring Standard 53, which would include fine particulate." (Tr. (Herman) at 1209:18-21.).

Thus, although claim 1 does not expressly require a certain level of fine particulate lead, one of ordinary skill reading the claim in the context of the specification would understand that fine particulate lead should be included as part of a reliable and accurate pH 8.5 lead challenge water testing protocol. As Mr. Herman explained, using challenge water that does not control fine particulate lead could produce highly variable results. (*Id.* at 1201:24-1202:4.). However, he chose not to control fine particulates because he wanted to "demonstrate the inherent variability of the '141 patent." (*Id.* at 1208:13-18.). Accordingly, Respondents' testing (which is an integral part of their arguments about invalidity and non-infringement) has been given little, if any, weight. (*Id.* at 1201:24-1202:4, 1204:11-19, 1209:22-1211:8 (Mr. Herman acknowledging that the protocol caused, and was to some extent, designed to cause, "extreme variability").).

Respondents also contended that their testing was acceptable given Brita's own lack of controlling the fine particulate content in its test water. (RBr. at 66.). This allegation is contradicted by the evidence. Brita included a specification for fine particulate lead in its testing protocol, and it measured and reported information sufficient to determine fine particulate lead for every sample of challenge water. (RX-0432C at BRITALP-0033015 (Brita's updated 8.5 Pb Test); CX-0912C (Brita's report of lead concentration measurements);[33] *see also* CBr. at 28-30.).

[33] According to Brita, CX-0912C consists of data exported as kept by an inductively coupled plasma mass spectrometer ("ICP-MS"). (CBr. at 28; *id.* at 28 n.5.). Mr. Nishijima explained that this instrument was used because, at the time, it was more accurate than other alternatives and because the NSF/ANSI 53 (2007) standard required it for measurements of effluent. (Tr. (Nishijima) at 318:3-7; CX-0010.0080 (requiring USEPA Method 200.8 or 200.9 for effluent measurements).). The influent and effluent measurements, as well as the calibration measurements for the ICP-MS instrument, were exported from the machine and reported in CX-0912C. (Tr. (Nishijima) at 318:8-17.).

This is also confirmed by Mr. Nishijima's cross-examination testimony.

> Q. Because you did not follow NSF 53 2007 protocol for your testing water or your testing effluents, did you.
>
> A. We followed it for the water makeup, yes.
>
> Q. Hold on, Mr. Nishijima. ***You're telling me that you also followed it for the fines as well?***
>
> A. ***We followed the recipe, that's what I meant to say, we followed the recipe for the water makeup of the water.***

(Tr. (Nishijima) at 421:24-422:6 (emphases added).).

Respondents, on the other hand, neither controlled fine particulate lead in their testing protocol, nor measured it in their testing results. (*See* RX-0985.0023-25 (failing to report particulate lead by size).).

As a result, the "extreme variation" that appears in Respondents' testing is not present in Brita's testing. (*Compare* RX-0985.0013-20 (reporting lead effluent values for Brita Legacy between 1 and 62 ppb, for DuPont between 1 and 41.5 ppb, and for PUR 1-Stage between 1 and 83 ppb) *with* CBr., App. A at 1-2 (effluent lead values between 1 and 10 ppb for the PUR Plus Filter, 0.003 to 0.139 ppb for the ZeroWater Filter, and 0.09 to 0.27 ppb for the LifeStraw Home Filter); *see also* CDX-0017C.0006-14 (demonstrating extreme variation in Respondents' data).).

Respondents pointed to a single data point in Brita's infringement testing where fine particulate levels dropped below the nominal amount. (RBr. at 67.). They asserted that this drop

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The data contained in CX-0912C includes several columns beginning with the numbers 206, 207, 208, 103, and 209. (*See* CBr. at 28 n.5.). Brita submitted that for the purposes of this Investigation, the column that contains the relevant lead concentration measurements is the "Conc. [ppb]" column located under the "208 Pb [Nogas]" heading. (*Id.* (citing Tr. (Nishijima) at 319:5-9.).). Brita also stated that the "Sample name" column identifies the sample being analyzed and the date on which it was analyzed; and the rows having an entry in the "Type" column other than "Sample" are related to the calibration of the ICP-MS instrument to ensure accuracy. (*Id.*).

in fine particulates corresponded with a similar drop in effluent lead. (*Id.*). Respondents are incorrect. Respondents argued that the effluent lead was four times higher at the 25% sample versus the 100% sample corresponding to a lower level of fine particulate lead at the 100% sample. (RBr. at 67.). However, as is reflected in Appendix A of Brita's Post-Hearing Brief, the effluent lead level does not so correlate to the fine particulate level in Brita's testing. (*See* CBr. at App. A.). The effluent lead at the 1%, 50%, and 75% samples was well below 10.7 ppb at the 25% sample despite fine particulate being higher at those samples than at the 25% sample point (approximately 50% v. 36%). (*Id.* at 1 (citing CX-0912C.0001, 0004-0007).).

Additionally, Respondents' protocol called for a total lead value of 120-140 ppb. (RX-0986C.0015.). As Brita pointed out, Respondents targeted the bottom 25% of the range of total lead allowed by the '141 patent and prescribed by the NSF/ANSI 53 Standard. (JX-0022 at cl. 1; CX-0010.0080.). When Mr. Herman was asked if this targeting of the low end of the allowable lead range was done because putting less lead into a filter (via challenge water with lower amounts of lead) would result in less lead measured in the water exiting the filter, he replied that this was a "reasonable assumption." (Tr. (Herman) at 1168:22-1169:2.).

Mr. Nishijima explained that the common practice of those in the industry—and the practice Brita employed—is to target approximately that nominal value, which sits in the middle of the allowable range. (RX-2611C (Nishijima) at 164:9-165:12, 165:20-166:20 (explaining that Brita targets just below the nominal value when preparing challenge water to be able to adjust the levels upward to get as close to nominal as possible).).

Testing data that Respondents presented indicates that their testing fell outside the scope of the asserted claims. For example, QFT fell below the prescribed minimum of 90 ppb soluble lead in their challenge water on five out of the first seven days of testing, as shown below in

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Table No. 1.

Table No. 1: QFT Challenge Water Data

Gallons	Date	Influent Lead Beginning	Soluble Lead Beginning	Collodial Lead Beginning	Influent Lead End	Soluble Lead End	Collodial Lead End
2.5	4/19/22	131.6	94.1	37.5	139.3	96.0	43.3
5.0	4/20/22	141.2	99.3	41.9	130.4	86.1	44.3
7.5	4/21/22	130.6	97.3	33.3	127.0	86.9	40.1
10.0	4/22/22	124.4	88.8	35.6	121.0	87.6	33.4
12.5	4/23/22	135.9	93.9	42.0	125.5	90.6	34.9
15.0	4/24/22	136.8	84.4	52.4	135.9	102.7	33.2
17.5	4/25/22	118.4	84.8	33.6	135.4	99.9	35.5

(RX-0985.0023 (copied from CRBr. at 17) (showing soluble lead levels below 90 ppb on April 20, 21, 22, 24, and 25); *see also* Tr. (Herman) at 1169:3-18 ("Q. And we agree that on the days where the rows are highlighted that the challenge water was either out of specification at the start of the day or at the end of the day, right? A. Yes. The grab sample that was taken show that the soluble lead was below the 90.").).

Similarly, Helen of Troy exposed the filters it tested to challenge water that did not meet either PUR's protocol or the '141 patent claims. (RX-0985.0024-0025 (soluble or colloidal lead of challenge water out of specification at 50L, 90L, 108L, in the first round of testing and 10L, 18L, and 28L in the second round of testing).).

During the Hearing, Mr. Herman dismissed these "incursions" as immaterial. (Tr. (Herman) at 1073:13-21, 1074:4-1075:2, 1098:21-1099:20.). However, as Brita noted, he did not offer any evidence to support his conclusion and even acknowledged that he was "concerned" enough by QFT's failure to stay within the specification that he modified the protocol and followed up shortly after to ensure the testing was within specification. (CRBr. at 17.).

Q. Mr. Herman, did you change your testing procedures midway through?

A. I made some changes at the 20 gallon point.

Q. And what changes did you make?

> A. Well, I was -- first, I was concerned that Mr. Young had actually allowed the soluble lead to drop below the lower limit. And I realized in discussing with him that the reason that that had occurred was he was so used to running a Standard 53 that doesn't actually monitor soluble lead, that in monitoring total and particulate he felt he was within specification.
>
> So I narrowed some of the ranges, gave him some targets to hit, and reminded him he needed to make sure he was hitting those targets. So I gave him targets for the soluble lead and for the particulate lead. I didn't change the target that had been provided for the total lead for the test.
>
> I also added some additional things to tighten up the integrity of the test. One thing I told him that I wanted the tanks verified that they were within specification before he would ever use them and put any water into the filtration systems.
>
> I also told him that I wanted the sample points to be done as the first pour after he had verified those tanks as being within specification to make sure that we were having, you know, getting it measured properly.

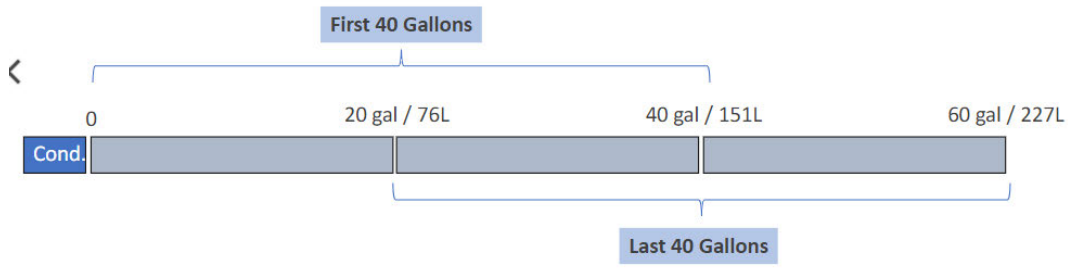
(Tr. (Herman) at 1100:13-1111:13.).

As Brita pointed out, if falling outside the specification was indeed immaterial, there would have been no need for Mr. Herman to modify the testing protocol. (CRBr. at 17.).

Mr. Nishijima explained that during Brita's testing, when the challenge water did not meet the specification, he either brought the water into compliance or discarded the water and remade it. (Tr. (Nishijima) at 311:11-20.). Respondents did neither. Instead, Mr. Herman attempted to recover the QFT testing by extending the test to 60 gallons.[34] (Tr. (Herman) at 1075:22-1077:13; RX-0684C at PUR0014450 ("[r]un current tests [] to 60 gallons").). Mr. Herman explained that a test of 60 gallons where the first 20 gallons of challenge water were out of specification is actually two valid 40-gallon tests: a test from zero to 40 gallons and a test from 20 to 60 gallons, as shown below in his demonstrative, reproduced below in Figure No. 4. (Tr. (Herman) at 1077:4-13.).

[34] Neither Mr. Herman nor Mr. Mitchell provided any testimony about any attempt to fix the out-of-specification challenge water in the testing performed at Helen of Troy.

Figure No. 4: Herman Demonstrative Illustrating First and Last 40 Gallons



(RDX.0007C.0036.).

However, as Brita correctly noted, this resulted in: (i) a 40-gallon test where half of the test used invalid challenge water; and (ii) a 40-gallon test where the filters had already had half of their alleged lifetime expended, i.e., a 60-gallon test, neither of which constitutes a valid test within the meaning of claim 1 of the '141 patent. (CRBr. at 19; JX-0022 at cl. 1 (requiring a minimum of 90 ppb of soluble lead and that testing be conducted over the filter's lifetime).).

The "First 40 Gallons" test does not meet claim 1 because the challenge water was not within the claimed specification of 90-120 ppb. (RX-0985.0023.). The "Last 40 Gallons" test does not meet claim 1 because the claim requires the lead effluent concentration (c_e) be measured at the end of the filter's lifetime, which Respondents alleged to be 40 gallons. Under Respondents' modified protocol, the lead effluent concentration at the end of lifetime was measured at 60 gallons, not at 40 gallons. (*Compare* RX-0985.0002-03 (identifying effluent values for "Last 40 Gallons" tests) *with id.* at 0013-29 (reporting effluent values at 60 gallons or 150% of filter lifetime identical to those for "Last 40 Gallons" effluent values).).

Brita also argued that Respondents' testing protocol departed from the '141 patent in how the average filtration unit time was measured because Respondents measured filtration unit times at only five or six liters over the alleged lifetime of the tested filters. (CRBr. at 15 (citing RX-0985.0013-22, 0024-25; Tr. (Herman) at 1183:20-1184:6); *see also id.* at 19-20.). Brita pointed

to a disclosure in the ’141 patent and explained that the average filtration unit time is “the time it takes to filter one liter of water averaged over ***all filtered liters*** in the defined filter lifetime.” (*Id.* at 15 (emphasis in original) (citing JX-0022 at 25:40-42).). Additionally, Brita relied upon the adopted construction of “average filtration unit time over lifetime L,” which was construed to mean “***the*** average time (in minutes) that it takes to filter one liter of water ***over the filter usage lifetime***.” (*Id.* at 19 (emphases in original) (citing *Markman* Order at 24).). According to Brita, the disclosure in the specification and the adopted construction support its contention that the filtration unit time should be measured at each filtered liter in the lifetime. (CRBr. at 15,

Although Brita is correct that the ’141 patent defines average filtration unit time as “the time it takes to filter one liter of water averaged over all filtered liters,” as Respondents pointed out, the ’141 patent does not instruct a person of ordinary skill in the art to test flow rate ***at every liter***. (*See* RBr. at 65; Tr. (Herman) at 1106:17-1107:2, 1221:8-19.). To the contrary, the flow rate in the ’141 patent is shown to have been collected at 3-6 sample points along the filter’s lifetime. For example, Table Nos. 2 and 3 of the ’141 patent, reproduced below in Table Nos. 2 and 3, indicate that the average flow rate for the prior art filters was calculated using 6 data points at 3, 76, 151, 227, 273, and 303 L or 3 data points at 3, 76, and 151 L to calculate the “average.” (*See* Tr. (Herman) at 1222:6-1223:24, 1235:6-20.).

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Table No. 2: Table 2 of the '141 Patent

TABLE 2

Liters Filtered	3 L	76 L	151 L	227 L	273 L	303 L	average
PA3-5							
Effluent Total Pb Conc. (ppb)	8.68	7.94	9.53	9.05	10.95	11.87	9.7
Influent Total Pb Conc. (ppb)	161.9	153.5	149.7	158.9	162.6	156.2	157
Influent Sol. Pb Con. (ppb)	112.8	108.8	106.7	116.1	112.4	109.8	
% Colloidal Particulate Influent	30.3	29.1	28.7	26.9	30.9	29.7	29
% Total Pb Removed	94.6	94.8	93.6	94.3	93.3	92.4	
Flow Rate (min./liter)	0:05:00	0:04:32	0:04:30	0:03:28	0:03:28	0:03:30	0:04:09
PA3-8							
Effluent Total Pb Conc. (ppb)	7.24	5.86	7.45	7.01	8.21	8.47	7.4
Influent Total Pb Conc. (ppb)	166.7	156.6	150.2	169.8	165.3	161.3	162
Influent Sol. Pb Con. (ppb)	115.9	111.9	104.9	116.6	112.4	109	
% Colloidal Particulate Influent	30.5	28.5	30.2	31.3	32.0	32.4	31
% Colloidal Particulate >1.2 microns	39.2	31.8	23.0				31
% Total Pb Removed	95.7	96.3	95.0	95.9	95.0	94.7	
Flow Rate (min./liter)	0:04:48	0:04:18	0:04:18	0:03:34	0:03:35	0:03:39	0:04:03
PT3-4							
Effluent Total Pb Conc. (ppb)	6.76	5.42	6.25	6.67	7.84	8.55	6.9
Influent Total Pb Conc. (ppb)	163.3	157.2	150	166.1	161.2	160.1	160
Influent Sol. Pb Con. (ppb)	114.5	108.2	108.1	116	114.1	112.6	
% Colloidal Particulate Influent	29.9	31.2	27.9	30.2	29.2	29.7	30
% Total Pb Removed	95.9	96.6	95.8	96.0	95.1	94.7	
Flow Rate (min./liter)	0:05:19	0:04:31	0:04:29	0:03:39	0:03:36	0:03:37	0:04:13
PT3-6							
Effluent Total Pb Conc. (ppb)	7.09	11.37	13.29	14.17	14.35	14.62	12.5
Influent Total Pb Conc. (ppb)	166.8	158.3	151.3	169.5	182.8	168.6	166
Influent Sol. Pb Con. (ppb)	118.7	111.5	106	115.8	113.5	112	
% Colloidal Particulate Influent	28.8	29.6	29.9	31.7	37.9	33.6	32
% Colloidal Particulate >1.2 microns				36.5	53.1	42.0	44
% Total Pb Removed	95.7	92.8	91.2	91.6	92.1	91.3	
Flow Rate (min./liter)	0:20:19	0:04:22	0:04:08	0:03:02	0:03:06	0:03:05	0:03:51
PT3-4 - alternate housing							
Effluent Total Pb Conc. (ppb)	1.17	5.08	1.25	3.75	5.08	6.43	3.8
Influent Total Pb Conc. (ppb)	127.5	154.6	135.9	131.4	126	131.8	135
Influent Sol. Pb Con. (ppb)	106.7	109.6	105.6	90.6	88.6	84.6	
% Colloidal Particulate Influent	16.3	29.1	22.3	31.1	29.7	35.8	27
% Colloidal Particulate >1.2 microns			39.3	25.5	17.1	23.5	26
% Total Pb Removed	99.1	96.7	99.1	97.1	96.0	95.1	
Flow Rate (min./liter)	0:06:20	0:06:02	0:05:26	0:05:28	0:05:42	0:05:31	0:05:36
PT3-11							
Effluent Total Pb Conc. (ppb)	7.69	6.94	8.46	5.42	3.34	4.21	6.0
Influent Total Pb Conc. (ppb)	181.6	172.1	164.5	148.5	142	134.4	157
Influent Sol. Pb Con. (ppb)	133	119.7	118.6	98.9	87.9	84.8	
% Colloidal Particulate Influent	26.8	30.4	27.9	33.4	38.1	36.9	32
% Total Pb Removed	95.8	96.0	94.9	96.4	97.6	96.9	
Flow Rate (min)	0:04:32	0:04:20	0:04:23	0:03:54	0:03:54	0:03:49	0:04:09
PT3-13							
Effluent Total Pb Conc. (ppb)	8.78	7.73	9.2	3.7	4.16	4.62	6.4
Influent Total Pb Conc. (ppb)	185	170.5	167.5	145.6	133	127.1	155
Influent Sol. Pb Con. (ppb)	120.9	108.2	116.2	97.9	91	85.6	
% Colloidal Particulate Influent	34.6	36.5	30.6	32.8	31.6	32.7	33
% Total Pb Removed	95.3	95.5	94.5	97.5	96.9	96.4	
Row Rate (min)	0:04:25	0:04:11	0:04:15	0:03:57	0:03:49	0:03:52	0:04:04

(JX-0022 at Table 2 (ann.); *see also id.* at 29:2-5 (explaining that collection occurred at 3, 76, 151, 227, 273, and 303 liters which corresponds to 2, 50, 100, 150, 180, and 200% of filter life).).

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Table No. 3: Table 3 of the '141 Patent

TABLE 3

Liters Filtered	3 L	76 L	151 L	227 L	273 L	303 L	average
Brita Granular							
Effluent Total Pb Conc. (ppb)	39.30	40.86	42.21	42.50	46.15	41.27	42.05
Influent Total Pb Conc. (ppb)	170.10	160.00	182.70	171.90	167.60	164.70	169.50
Influent Sol. Pb Con. (ppb)	118.30	109.90	107.60	117.50	116.90	115.40	
% Colloidal Particulate Influent	30.5%	31.3%	41.1%	31.6%	30.3%	29.9%	32.5%
% Total Pb Removed	76.9	74.5	76.9	75.3	72.5	74.9	
Flow Rate (min./liter)	0:02:50	0:06:05	0:05:28	0:05:59	0:06:17	0:06:33	0:05:32
Maxtra 55:45							
Effluent Total Pb Conc. (ppb)	36.43	40.85	43.77	45.46	46.04	45.59	43.02
Influent Total Pb Conc. (ppb)	170.00	159.90	153.20	165.80	164.10	166.60	163.27
Influent Sol. Pb Con. (ppb)	119.40	110.00	104.50	113.80	115.00	113.00	
% Colloidal Particulate Influent	29.8%	31.2%	31.8%	31.4%	29.9%	32.2%	31.0%
% Total Pb Removed	78.6	74.5	71.4	72.6	71.9	72.6	
Flow Rate (min./liter)	0:04:41	0:04:51	0:04:51	0:04:39	0:04:40	0:04:42	0:04:44
PUR 2stage							
Effluent Total Pb Conc. (ppb)	4.85	26.06	30.24	NA	NA	NA	20.38
Influent Total Pb Conc. (ppb)	170.60	159.00	152.20	NA	NA	NA	160.60
Influent Sol. Pb Con. (ppb)	117.50	113.20	110.70	NA	NA	NA	
% Colloidal Particulate Influent	31.1%	28.8%	27.3%	NA	NA	NA	29.1%
% Total Pb Removed	97.2	83.6	80.1				
Flow Rate (min./liter)	0:08:15	0:22:59	0:16:53	NA	NA	NA	0:16:02
PUR 2stage							
Effluent Total Pb Conc. (ppb)	2.89	32.38	38.60	NA	NA	NA	24.62
Influent Total Pb Conc. (ppb)	161.10	165.20	158.00	NA	NA	NA	161.43
% Total Pb Removed	98.2	80.4	75.6				
Flow Rate (min./liter)	0:08:13	0:12:15	0:12:30	NA	NA	NA	0:18:52
PUR 2stage							
Effluent Total Pb Conc. (ppb)	2.95	32.56	39.56	NA	NA	NA	25.02
Influent Total Pb Conc. (ppb)	162.20	138.70	149.40	NA	NA	NA	150.10
% Total Pb Removed	98.2	76.5	73.5				
Flow Rate (min./liter)	0:07:35	0:12:41	0:10:58	NA	NA	NA	0:15:29

(JX-0022 at Table 3 (ann.); *see also id.* at 29:2-5 (explaining that collection occurred at 3, 76, 151, 227, 273, and 303 liters which corresponds to 2, 50, 100, 150, 180, and 200% of filter life).).

As Respondents noted, the '141 patent does not disclose a single embodiment where the flow rate is measured at every liter. (RBr. at 65.).

Furthermore, the fact that the flow rate was not measured at every liter is not inconsistent with the adopted construction of the term "average filtration unit time over lifetime L." (*See Markman* Order at 24.). Part of the rationale set forth in the *Markman* Order relied upon disclosure in the '141 patent that describes measuring the flow rate. (*Id.* at 25 (citing JX-0022 at 25:40-42, 28:64-29:2 ("The flow rates were measured by filling a liter reservoir of a standard Brita® pitcher with the lead challenge water. The time required for the water to filter through the filtration material was recorded and the resulting effluent water was reported tested as

indicated in Table 2.”).). As shown in Table 2 replicated in Table No. 2 above and as explained in the ’141 patent, “[t]he filtrate effluents were collected after 3, 76, 151, 227, 273, and 303 liters of challenge water had been filtered.” (JX-0022 at 29:2-5, Table 2.).

In its Post-Hearing Reply Brief, Brita stated that “there is no dispute that Table 2 of the patent, which reports tests of the ***embodiments*** of the patent, showed that the inventors measured flow rate at every liter.” (CRBr. at 20 (emphasis in original) (citing Tr. (Herman) at 1186:1-9).). However, Mr. Herman’s testimony to which Brita cited does not “show[] that the inventors measured flow rate at every liter.” He simply confirmed that for the filters contained in Table 2 of the ’141 patent, based on ***Dr. Knipmeyer’s*** “***notebooks***,” “she tested and measured the volume at each liter.”

> Q. . . . And you acknowledge that Dr. Knipmeyer appeared to use average filter rates on a per liter basis for most, if not all, of the prototypes in her Table 2, correct?
>
> A. ***In the data I reviewed from the notebooks, that appears what they did for many of them.***
>
> Q. And you heard her testify – I’m sorry. Did you hear her testify on Wednesday?
>
> A. Yes, I did, mm-hmm.
>
> Q. And you heard her testify that was her standard procedure for measuring flow rates for her prototypes.
>
> A. Yes, she said that was her standard procedure for testing and the embodiments.
>
> Q. You don’t dispute that that’s how Dr. Knipmeyer did it when she was testing her prototypes.
>
> A. When -- from what I can see, when she was testing the items in Table 2, which is the embodiments, that she tested and measured the volume at each liter.

(Tr. (Herman) at 1185:18-1186:9.).

To the extent Brita and Dr. Knipmeyer did test every liter for the prototype embodiments of the ’141 patent, it appears this information was confidential and not disclosed in the ’141

patent. (Tr. (Nishijima) at 331:15-332:24 ("It is our internal protocol, so I would consider it, yeah, confidential."); Tr. (Herman) at 1221:20-1222:5 ("Q. You were asked about Dr. Knipmeyer's underlying testing in her notebooks. Do you recall that? A. Yes. Q. Where she tested some of the prototypes every liter? A. Yes. Q. Did any of that prototype information or instructions or protocol that you have to test every liter, did any of that make it into the '141 patent? A. No, I did not see any evidence of that.").).

Moreover, in addressing infringement and invalidity issues in this case, Brita's experts seemingly took conflicting approaches to the meaning of average filtration unit time over lifetime, which undermines Brita's argument that flow rate should have been measured at every liter. For example, Brita's infringement expert, Dr. Rockstraw, purported to test flow rate at every liter. (*See, e.g.*, RX-0413C (flow data).). In contrast, to demonstrate entitlement to an earlier priority date, a different expert, Dr. Freeman, relied on lab notebook data that used as few as three (3) data points to show that Brita conceived and reduced to practice the purported invention earlier than the '141 patent filing date. (*See, e.g.*, RX-0878C.0020-21 (Freeman Rpt.) at ¶ 63 (demonstrating a filter has "an average filtration time (f) of 5.4 min/L (i.e., the average of 5:47, 5:24, and 4:53)").).

In their Pre-Hearing Brief, Respondents provided the following chart, Chart No. 11, in support of the contention that "depending on the approach, the calculated average to be used in the so-called 'FRAP' equation will differ." (RPBr. at 23.).

Chart No. 11: Comparing Averages of Filtration Unit Time Over Lifetime

(L)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	AVG
Method 1	5	5	5.5	5.5	6	6	6.5	6.5	7	7	7.5	7.5	8	8	8.5	6.663
Method 2	5				6					7					8.5	6.625

(*Id.* (annotated).).

Although Respondents' data shows a potential difference in the calculated averages when using one method as opposed to the other, that is 6.663 v. 6.625, it appears that any differences would be immaterial and would not significantly affect the FRAP factor calculation. (RPBr. at 23 (acknowledging that the "change in result is ***slight***") (emphasis added).).

Brita's argument that Respondents have not accurately shown the FRAP values of the prior art filters because the average flow rate (f) was not calculated for every liter over the lifetime of the filter is not persuasive.

Nonetheless, for the additional reasons discussed above, Brita proffered compelling testimony and evidence that Respondents' testing is unreliable.

C. Accused Products that Brita Tested

1. PUR Plus Products

The Accused PUR Plus Products include the Accused PUR Plus Filters, including the Accused PUR Plus Mario 2 Filter and the Accused PUR Plus Mario 3 Filter. (CPBr. at 9-10; CBr. at 10; Tr. at (Rockstraw) at 470:10-13; CDX-0008C.0012-13 (demonstrating evidence pertaining to same).). Brita only tested the Mario 2 variant of the Accused PUR Plus Filters. However, PUR stipulated that "the structure, composition, and function of the Mario 2 product is representative of the structure, composition, and function of the Mario 3 product such that any findings regarding infringement or non-infringement of the Mario 2 product will also apply to the Mario 3 product." (JX-0021 at ¶ 3 (stipulating that Mario 2 is representative of Mario 3); Tr. (Rockstraw) at 470:17-471:1.). Thus, the Accused PUR Plus Mario 3 Filters and compatible Accused PUR Plus Containers sold with Accused PUR Plus Mario 3 Filters practice claims 1-3 and 23 of the '141 patent for the reasons discussed below in Sections X(B)-(D) with respect to

the Accused PUR Plus Mario 2 Filters and compatible Accused PUR Plus Containers sold with Accused PUR Plus Mario 2 Filters. (*See* Sections X(B)-(D), *infra*; *see also* Tr. (Rockstraw) at 470:17-471:1.).).

2. ZeroWater Products

The Accused ZeroWater Products include the Accused ZeroWater Filter and the Accused ZeroWater Containers that are sold together with Accused ZeroWater Filter. (CPBr. at 10; CBr. at 11; CX-0569C.0011-12 (identifying ZeroWater systems and stating they are used with "ZeroWater flagship Filter"); CX-0016 (ZeroWater website); CX-0570C.0001 (indicating that the ZeroWater Filter is used with various container models).). Respondents did not contest that Brita tested the relevant products. (*See* RRBr. at 7-10.).

Additionally, ZeroWater manufactures certain purported redesign filters—the Accused ZeroWater Redesign Filters—which are also accused. (CPBr. at 10; CBr. at 12.). The Accused ZeroWater Redesign A (ZP-006-A), B (ZP-006-B), C (ZP-006-C), and D (ZP-006-D) Filters are identical to the Accused ZeroWater Filter. This conclusion is supported by the testimony of Dr. Rockstraw; ZeroWater's CEO, Mr. Douglas Kellam;[35] and by ZeroWater's counsel, Mr. Brandyberry. (*See* Tr. (Rockstraw) at 484:15-485:6; CX-0692C (Kellam Dep. Tr.) at 159:4-19; CX-0943 (Apr. 22, 2022 Brandyberry Letter); CDX-0008C.0038 (summarizing letter); *see also* Section X(H), *infra* (discussing infringement of the Accused ZeroWater Redesign Filters).).

3. LifeStraw Products

Brita accused the following LifeStraw products, each available in various packaging and

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[35] At the time of his deposition on May 3, 2022, and his Hearing testimony on August 22, 2022, Mr. Douglas Kellam was the President of Zero Technologies LLC. (RPSt. at 5.). Respondents identified Mr. Kellam as a fact witness to testify about, *inter alia*, "the Zero Technologies LLC company, the ZeroWater Accused Product and Products, the ZeroWater prior art filter and systems, and ZeroWater's decision to certify its products under NSF/ANSI standards." (*Id.*).

color configurations: (i) 7-Cup Plastic Pitcher; (ii) 7-Cup Glass Pitcher; (iii) 10-Cup Plastic Pitcher; (iv) 18-Cup Dispenser; (v) Replacement Activated Carbon and Ion Exchange Filter; and (vi) Replacement Membrane Microfilter (with bonus Activated Carbon and Ion Exchange Filters). (*See* CBr. at 14-16.). Brita only tested the LifeStraw two-stage filter (consisting of both the Membrane Microfilter and the Activated Carbon Ion Exchange Filter) in a single container—the 10-Cup Plastic Pitcher. (Tr. (Nishijima) at 403:1-10.).

Respondents argued that Brita did not meet its burden to show infringement on any Accused LifeStraw Home Containers other than the container specifically tested. (RRBr. at 15-17.). However, Brita's basis for infringement of claims 1-5, which are directed to ***filters***, is the LifeStraw Home Filter, which LifeStraw sells with a variety of containers and dispensers. (JX-0022 at cls. 1-5.). Because all the LifeStraw Home products use the same filter system, the infringement analysis is identical regardless of the particular container system sold with the LifeStraw Home Filter. (*See, e.g.*, Tr. (Alison Hill)[36] at 933:22-934:10 (describing pitchers and replacement filters that are part of the LifeStraw Home product line); CX-0695C (Hill Dep. Tr.) at 50:20-51:18 (identifying various pitchers that use the Accused LifeStraw Home Filter and replacement Accused LifeStraw Home Filters); FAC, Ex. 10 at 1 (indicating that the membrane microfilter and activated carbon + ion exchange filter are "[c]ompatible with all LifeStraw Home Pitcher and Dispenser products") (emphasis added); CX-0036 (showing that the LifeStraw Home pitchers include both a membrane microfilter and an activated carbon + ion exchange filter); CX-

[36] When she testified during the Hearing on August 22, 2022, and during her deposition on May 11, 2022, Ms. Alison Hill was the Chief Executive Officer of Respondent LifeStraw. (Tr. (Hill) at 924:16-18; CX-0695C (Hill Dep. Tr.) at 8:12-22.). Respondents identified Ms. Hill as a fact witness to testify about, *inter alia*, "the LifeStraw company generally, the company mission, as well as the public interest associated with the uninterrupted operation of the company and its relevant Accused Products." (RPSt. at 5-6.).

0035 (same for LifeStraw Home Dispenser). Thus, Respondents' argument is irrelevant.

D. DI Products Brita Tested

Brita asserted that LongLast and LongLast+[37] Products ("DI Products") practice every limitation of claims 1-6 and 23 of the '141 patent.[38] (*See, e.g.*, CPBr. at 37; CBr. at 59.). Brita tested the DI Products using the same protocol that it followed for the Accused Products. (*See, e.g.*, CX-0910C.0004 (volume testing); CX-0911C.0016-18, 0023, 0024, 0028-33 (flow rate testing); CX-0912C.0002, 0003, 0007-09 (lead testing); CBr., App. A at 3.). Respondents' only rebuttal was that "[i]f Brita is believed that the '141 Patent requires NSF 53 (2007) influent lead challenge water, then Brita has not proven the satisfaction of the technical prong by either the LongLast or LongLast+ products" because "Brita's testing was not in compliance with NSF 53 (2007) protocol for the majority of the tests." (RRBr. at 19.). As discussed above in Section VIII(B), the '141 patent does not require the NSF/ANSI 53 (2007) standard. Accordingly, Respondents' assertion lacks both substance and merit.

E. Prior Art Products Respondents Tested

Respondents alleged that four (4) prior art filter systems anticipate the asserted claims of the '141 patent. (*See, e.g.*, RBr. at 20.). As Mr. Mitchell and Mr. Herman explained above in Section IX(B), Respondents conducted testing at two different laboratories (Helen of Troy and QFT) to test purported prior art filters that were sold and offered for sale in the United States on or before October 2006. (Tr. (Herman) at 1053:4-1056:2, 1058:22-1061:1; Tr. (Mitchell) at 766:4-767:21; RX-0986; RX-0684; RBr. at 20.).

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[37] LongLast+ was "recently rebranded as Elite." (*See* CPBr. at 9; *see also* Tr. (Kahn) at 286:12-14.).

[38] [redacted] at 431:14-19.). When he testified during the Hearing on August 18, 2022, [redacted] at 428:20-22.).

1. PUR 1-Stage, Brita Legacy Granular, and Dupont WF-PTC 100 Products

Mr. Herman confirmed that he tested the PUR 1-Stage (1450 and 1450Z),[39] Brita Legacy Granular (1999),[40] and the Dupont WF-PTC 100 (2005 and 2007)[41] prior art filters. (Tr. (Herman) at 1028:6-15; RDX.0007C.0017, 0025-28.).[42] Brita did not contest that Respondents tested these products. (*See* CRBr. at 5-10.).

2. ZeroWater ZP-201 Filter

With respect to the ZeroWater ZF-201 filter, Mr. Herman testified that he "used . . . information from testing and documents from the 2006-2007 period" to calculate the FRAP value of the ZeroWater ZF-201 filter. (Tr. (Herman) at 1028:15-16.). Brita contended that "Respondents have offered no contemporaneous documentary evidence to show the composition or properties of the product sold in September 2006," but rather, "rel[ied] on a hodge podge of documents from 2006 to 2007 and beyond to claim the filter sold in September 2006 is identical to the filters referenced in those documents." (CRBr. at 10 (citing RBr. at 25-26).).

Specifically, as discussed in Section XII(B)(3)(d) below, Brita pointed out that the evidence Respondents relied upon to prove the characteristics of the ZF-201 filter are either undated or dated after September 2006. Accordingly, they do not clearly demonstrate what the

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[39] Mr. Herman testified that he analyzed the 1450 and 1450Z variants of the PUR 1-Stage filter. (Tr. (Herman) at 1029:5-12.).

[40] Mr. Herman testified that the packaging of the Brita Legacy filter he tested was copyrighted in 1999. (Tr. (Herman) at 1035:16.).

[41] Mr. Herman testified that the Dupont WF-PTC 100 filters he tested were the 2005 and 2007 versions. (Tr. (Herman) at 1038:2-10; *see also* RDX-0007C.0020.). The Dupont WF-PTC 100 filters are manufactured by ProtectPlus. (*See, e.g.*, Tr. (Herman) at 1230:9-14.).

[42] The prior art filters Respondents tested at Helen of Troy are listed on RDX.0007C.0026. The prior art filters Respondents tested at QFT are listed on RDX-0007C.0027-28.

FRAP factor would have been for the filter when it was allegedly first sold to Home Depot in September 2006. (*See* Section XII(B)(3)(d), *infra*.). Moreover, because no physical samples of the ZF-201 were produced in this Investigation, none of the experts were able to perform their own analysis of the filter. (Tr. Kellam) at 898:17-899:1.). As a result, Respondents failed to offer expert testimony that the ZF-201 filter actually anticipates the '141 patent. Instead, Mr. Herman provided only "observations" he made from reviewing documents about the filter without drawing any conclusions about whether the ZF-201 anticipates any claim. (RDX-0007C.0004.). Mr. Herman's "observations" are insufficient to support Respondents' allegations or arguments and therefore, lacked credibility.

X. DIRECT INFRINGEMENT[43]

A. Legal Standard: Literal Infringement

"Determination of infringement is a two-step process which consists of determining the scope of the asserted claim (claim construction) and then comparing the accused product . . . to the claim as construed." *Certain Sucralose, Sweeteners Containing Sucralose, and Related Intermediate Compounds Thereof*, Inv. No. 337-TA-604, Comm'n Opinion at 36 (U.S.I.T.C., April 28, 2009) (citing *Litton Sys., Inc. v. Honeywell, Inc*., 140 F.3d 1449, 1454 (Fed. Cir. 1998)).

An accused device literally infringes a patent claim if it contains each limitation recited in the claim exactly. *Litton*, 140 F.3d at 1454. Each patent claim element or limitation is considered material and essential. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538

[43] Brita did not allege infringement under the doctrine of equivalents ("DOE") or indirect infringement in its Pre-Hearing or Post-Hearing Briefs. (*See* CPBr. at 20-56; CBr. at 38-68.). Thus, any argument Brita might have made with respect to these issues has been deemed abandoned, withdrawn, or waived under Ground Rules 7.2. and/or 10.1.

(Fed. Cir. 1991). In a Section 337 investigation, the complainant bears the burden of proving infringement of the asserted patent claims by a preponderance of the evidence. *Enercon GmbH v. Int'l Trade Comm'n,* 151 F.3d 1376, 1384 (Fed. Cir. 1998). If any claim limitation is absent, there is no literal infringement of that claim as a matter of law. *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1247 (Fed. Cir. 2000).

B. The Accused PUR Plus Products Practice Claim 1 of the '141 Patent

1. "A gravity-fed water filter, comprising"[44]

In response to Brita's Requests for Admission ("RFA"), PUR admitted that the Accused PUR Plus Filters are "gravity-fed water filter[s]." (CX-0802C.0006, 0008 (PUR Obj. and Resp. to RFA Nos. 175, 179).). Brita also provided documentary evidence demonstrating that the Accused PUR Plus Filters are gravity-fed water filters because water passes through them due to gravity. (CX-0464C.0029 (PUR presentation indicating "PUR Pitcher Filters use ***gravity*** to filter") (emphasis in original); CDX-0008C.0016 (Rockstraw demonstrative identifying same); *see also* Tr. (Rockstraw) at 472:11-21.).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters meet the preamble of claim 1 of the '141 patent.

2. "filter media including at least activated carbon and a lead scavenger"

As discussed below, the Accused PUR Plus Filters also have a "filter media including at least ***activated carbon*** and a ***lead scavenger***" as recited in claim 1, which PUR did not contest. (Tr. (Rockstraw) at 472:22-473:12; CDX-0008C.0018 (demonstrating evidence pertaining to same).).

[44] The Parties agreed that the preamble was limiting with respect to "gravity-fed water filter." (*Markman* Order at 8.). Accordingly, the Parties' position was adopted. (*Id.*).

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CONFIDENTIAL MATERIAL OMITTED

a) "activated carbon"

In response to Brita's RFA, PUR admitted that the Accused PUR Plus Filters contain activated carbon. (CX-0802C.0009 (PUR Obj. and Resp. to RFA No. 181).). Brita also provided testimonial and documentary evidence demonstrating the same. (Tr. (Rockstraw) at 473:2-12; CX-0482C.0001 [redacted]; CX-0175C.0007 (S&N Labs Report confirming presence of both activated carbon and ion exchange resin);[45] CX-0152C (S&N Labs PUR Plus Data); CDX-0008C.0018-19 (evidence pertaining to same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

b) "lead scavenger"[46]

In response to Brita's RFAs, PUR admitted that the filter media of the Accused PUR Plus Filters contains ion exchange resins, which are lead scavengers because they remove or reduce lead in water. (CX-0802C.0011, 0015 (PUR Resp. RFAs 185 and 193).). Moreover, PUR's fact witness, Mr. Mitchell, confirmed that the ion exchange resins reduce lead in water. (CX-0696C (Mitchell Dep. Tr.) at 157:8-21, 182:9-21 (testifying that the ion exchange resin of the Accused PUR Plus Filters removes lead).). This was also confirmed by documentary evidence Brita

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[45] S&N Labs is an independent third-party laboratory. (*See, e.g.*, Tr. (Rockstraw) at 511:20.).

[46] "[L]ead scavenger" was construed to mean "[a] component that removes or reduces lead from water." (*Markman* Order at 20.). In their Pre-Hearing Brief, Respondents contended that "[i]f [Aqua Crest's] construction of lead scavenger is accepted, then the weak-acid ion exchange resins of the Accused PUR Products are not lead scavengers either literally or under the doctrine of equivalents." (RPBr. at 42 (citation omitted); *see also id.* at 26-28 (claim construction arguments regarding this term).). Because Aqua Crest's proposed construction, "metal ion exchange zeolite sorbents, aluminosilicates, and zirconia oxides and hydroxides," was expressly rejected, Respondents' Pre-Hearing arguments on this issue are moot. (*Markman* Order at 22-23.).

presented. (CX-0175C.0007 (S&N Labs Report); CX-0152C (S&N Labs PUR Plus Data); *see also* Tr. (Rockstraw) at 473:13-25 ("[i]on exchange resin is known to scavenge lead"); CDX-0008C.0019-22, 0030 (demonstrating evidence pertaining to same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

3. "wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula: FRAP = [V * f * c_e]/[L * 2]"

Based on, *inter alia,* Mr. Nishijima's measurements for volume **V** (CX-0910C.0002, 0003 (V = 155)), flowrate **f** (CX-0911C.0001, 0005, 0008, 0013 (f = 15.6)), lead effluent **c_e** (CX-0912C.0001, 0004-0007 (c_e = 2.5)) and the Accused PUR Plus Filter documents regarding lifetime **L** (CX-0466C (L = 40)), each of which are discussed in detail below, Dr. Rockstraw calculated the FRAP factor for the Accused PUR Plus Products, i.e., Accused PUR Plus Filters sold separately and those sold with the Accused PUR Plus Containers, to be 75.6, which is less than 350.

$$FRAP = \frac{[V * f * c_e]}{[L * 2]} = \frac{[155 * 15.6 * 2.5]}{[40 * 2]} = 75.6$$

(Tr. at (Rockstraw) at 475:1-5; CDX-0008C.0023-30 (calculating FRAP factor and summarizing evidence).).

For the reasons discussed, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

a) "where: V = volume of the filter media (cm^3)"[47]

Relying upon Mr. Nishijima's testing, Dr. Rockstraw testified that the filter media of the

[47] "[V]olume of the filter media" was given its "plain and ordinary meaning, i.e., quantity of the filter media in cubic units." (*Markman* Order at 8.). During the *Markman* proceedings, ZeroWater alleged that

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Accused PUR Plus Filters has a volume of approximately 155 cm^3: approximately 135 cm^3 for the granular media and 20 cm^3 for the pleated media. (Tr. (Rockstraw) at 475:6-12; CX-0910C.0002-03 (volume measurement); CDX-0008C.0024 (demonstrating evidence pertaining to same).).

Respondents did not dispute these volume measurements. (RPBr. at 41-42; RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

b) "f = average filtration unit time over lifetime L (min/liter)"[48]

Brita tested the filtration unit time for 146 of 152 filtered liters, averaged the values, and determined that the average time that it takes to filter one liter of water over the filter usage over 40 gallons (the lifetime of the Accused PUR Plus Filters) is approximately 15.6 minutes/liter.

this term was indefinite because the term, when "read in light of the specification and the prosecution history of the '141 Patent, fails to inform those skilled in the art of the scope of the invention with reasonable certainty." (RMBr. at 9 (citation omitted).). Respondents raised the same argument in their Pre-Hearing Brief. (RPBr. at 25-26.). Because ZeroWater's proposal was rejected, any Pre-Hearing arguments on this issue are moot. Moreover, these arguments were not raised in Respondents' Post-Hearing Reply Brief. (*See generally* RRBr.). Thus, any argument Respondents may try to make on this issue is deemed waived under Ground Rule 10.1.

[48] "[A]verage filtration unit time over lifetime L" was construed to mean "[t]he average time (in minutes) that it takes to filter one liter of water over the filter usage lifetime." (*Markman* Order at 24.). During the *Markman* proceedings, Respondents LifeStraw and ZeroWater alleged that this term is indefinite because the '141 patent "fails to inform those of ordinary skill in the art how to test for, measure, or calculate an 'average filtration unit time over lifetime L.'" (RMBr. at 20 (citing RXM-0020 (Decl. of Dr. Joseph Harrison) at ¶¶ 31-36).). Respondents LifeStraw and ZeroWater's proposal was rejected. (*Markman* Order at 25-33.). Respondents raised the same argument in their Pre-Hearing Brief. (RPBr. at 20-25.). Because Respondents LifeStraw and ZeroWater's proposal was rejected, any Pre-Hearing arguments on this issue are moot. Moreover, these arguments were not raised in Respondents' Post-Hearing Reply Brief. (*See generally* RRBr.). Thus, any argument Respondents may try to make on this issue is deemed waived under Ground Rule 10.1.

(CX-0911C.0001, 0005, 0008, 0013 (Flow Rate Testing); Tr. (Rockstraw) at 475:16-19, 477:3-20; CDX-0008C.0025 (demonstrating evidence pertaining to same).).

In their Pre-Hearing Brief, Respondents contended that "the Accused PUR Products do not infringe since the only flow rate data available is missing several data points and is not taken on a liter-by-liter basis." (RPBr. at 41 (citing RX-0413C at BRITALP-0024506-18).). For the reasons set forth in Section IX(A) above regarding Brita's testing protocols, the "missing" data points were found to be immaterial. Moreover, Respondents did not dispute this measurement in their Post-Hearing Reply Brief. (*See* RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is waived under Ground Rule 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

c) "c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter"[49]

Brita provided test results showing that the effluent lead concentration at the end of the filter lifetime for the Accused PUR Plus Filters is approximately 2.5 µg/L. (Tr. (Rockstraw) at 475:20-476:1 ("effluent lead concentration at end of lifetime was determined by collecting a sample of the last liter of water that passed through the filter and then testing that water using ICP mass spec according to EPA method 200.8"), 477:21-478:15; CX-0912C.0007 ("1-PUR-Pb, eff, 152L, 8-19-2021" effluent sample having a lead concentration of 2.5 ppb at 100% lifetime);

[49] The Parties agreed that the phrase "effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter" means "effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter." (*Markman* Order at 8.). Accordingly, the Parties' proposed construction was adopted. (*Id.*).

CBr., App. A at 1; CDX-0008C.0026, 0030 (summarizing evidence).). Testing conducted by the Water Quality Association ("WQA") also corroborated this measurement. (CX-0456C.0002 (WQA Test Report).). The results demonstrated an effluent lead concentration of 1 μg/L at the end of lifetime for all tested samples. (Tr. (Rockstraw) at 478:16-25; CX-0456C.0002 (WQA Test Report); CDX-0008C.0027 (summarizing evidence pertaining to same).).

In their Pre-Hearing Brief, Respondents argued that "Brita did not meet the 'fine' particulate requirements of NSF 53 (2007) standard when testing at several points, including the 100% point for the PUR Accused Products." (RPBr. at 41 (citing RPX-0159C).). As discussed in Section VIII(B) above with respect to the NSF/ANI 53 (2007) standard, the '141 patent does not require the standard. Moreover, PUR did not dispute these measurements in Respondents' Post-Hearing Reply Brief. (*See* RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is waived under Ground Rule 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

d) "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"[50]

The Accused PUR Plus Filters have a validated lifetime of 40 gallons–the total number of

[50] "[F]ilter usage lifetime claimed by a manufacturer or seller of the filter" adopted Brita's proposed construction and was construed to mean "[t]he total number of gallons of water that a manufacturer or seller has validated can be filtered before the filter is replaced." (*Markman* Order at 14.). As explained in the *Markman* Order, the word "claimed" was substituted with the word "validated," as Brita proposed, and should be interpreted in light of the NSF/ANSI 53 standard, which was incorporated by reference into the '141 patent. (*Id.* at 15 ("The NSF/ANSI 53 standard describes 'verified through testing,' which encompasses the proposed the proposed claim construction term of 'validated.'".).). However, it was found that "the standard is ***not required*** as the method of 'validation' because of the permissive language used in the specification of the '141 patent." (*Id.* at 16 (emphasis added); JX-0001 at 26:22 (stating that the standard "may" be used for FRAP testing); *see also* Section VIII(B), *supra* (addressing NSF/ANSI 53 standard with respect to the '141 patent).).

gallons that PUR has validated can be filtered before the Accused PUR Plus Filter is replaced. Brita presented evidence confirming that the Accused PUR Plus Filters are NSF/ANSI 53 certified for lead removal at pH 8.5 for 40 gallons. (CX-0466C (PUR Plus Filter Packaging reporting a lifetime of 40 gallons and an NSF/ANSI 53 certification for lead); CX-0455.0004-0005 (manual indicating the same).). PUR's NSF/ANSI 53 certification indicates that it reduces lead below 5 ppb for 200% of filter lifetime, which is below the 10 ppb threshold required to be certified for lead reduction under the NSF/ANSI 53 (2007) standard. (Tr. (Herman) at 1174:15-1175:9; CX-0690C (Franks Dep. Tr.)[51] at 52:17-21 (effluent lead concentration threshold under the current NSF/ANSI 53 standard is 5 ppb).). Therefore, the Accused PUR Plus Filters have a validated capacity of 40 gallons. (Tr. (Rockstraw) at 479:1-17; CDX-0008C.0028.).

PUR argued that Brita has not proven infringement because the effluent lead value exceeded 10 ppb at the 25% sample point. (RRBr. at 6; RPBr. at 41.). However, as Brita pointed out, PUR is improperly conflating the evidence and requirements of claim 1. (CBr. at 36.). Dr. Rockstraw testified that the FRAP test of PUR's product was done to establish the average filtration unit time over lifetime and the lead effluent lead concentration at end of lifetime. (Tr. (Rockstraw) at 478:4-15.). As Brita noted, neither of those two values are impacted by the effluent lead concentration at the 25% sample point. (CBr. at 36.). Moreover, Brita's testing was not done to determine a lifetime value for the Accused PUR Plus Products because the PUR Plus Products already had a validated lifetime of 40 gallons for lead reduction as demonstrated by its current NSF/ANSI 53 certification. (CX-0466C (indicating a lifetime of 40 gallons and an NSF/ANSI 53 certification for lead); CX-0455.0004-0005 (same).).

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[51] At the time of his deposition on April 27, 2022, Mr. John Franks was the Vice President of Engineering and Program Management at Respondent Helen of Troy. (CX-0690C (Franks Dep. Tr.) at 6:10-14; RPSt. at 5.).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice this limitation of claim 1 of the '141 patent.

C. The Accused PUR Plus Products Practice Claims 2 and 3 of the '141 Patent

1. Claim 2: "The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200."

For the reasons set forth above in Section X(B) regarding claim 1, the Accused PUR Plus Filters achieve a FRAP factor of 75.6. (Tr. (Rockstraw) at 480:13-21; CDX-0008C.0031 (demonstrating calculation of FRAP factor).). Likewise, they "achieve[] a FRAP factor of less than about 200" as recited in claim 2 of the '141 patent.

Moreover, Respondents did not present separate rebuttal arguments with respect to this claim. (RPBr. at 41-42; RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice the additional limitation recited in claim 2 of the '141 patent.

2. Claim 3: "The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3."

As discussed above in Section X(B) with respect to claim 1, Brita's testing shows that the volume of the filter media of the Accused PUR Plus Filters is approximately 155 cm^3. (CX-0910C.0002-0003 (volume testing); *see also* Tr. (Rockstraw) at 480:22-481:5; CDX-0008C.0032 (demonstrating evidence pertaining to same).). Similarly, the Accused PUR Plus Filters "is less than above 300 cm^3" as recited in claim 3 of the '141 patent.

Additionally, Respondents did not present separate rebuttal arguments with respect to this claim. (RPBr. at 41-42; RRBr. at 6-7.). Thus, any argument Respondents may try to make on

this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed, Brita has proven by a preponderance of evidence that the Accused PUR Plus Filters practice the additional limitation recited in claim 3 of the ’141 patent.

D. The Accused PUR Plus Products Practice Claim 23 of the ’141 Patent

1. “A gravity-flow system for filtering water, comprising”

The combination of Accused PUR Plus Containers and Filters (“Accused PUR Plus Products”) constitute “[a] gravity-flow system for filtering water” because, as PUR admitted in response to Brita’s RFAs, the Accused PUR Plus Filters are gravity-fed. (CX-0802C.0006-0008 (PUR Obj. and Resp. to RFA Nos. 175, 179).). This is also confirmed by documentary and testimonial evidence. (CX-0464C.0029 (PUR Presentation); Tr. (Rockstraw) at 481:6-482:11; *see also* CDX-0008C.0033-34 (demonstrating evidence pertaining to same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Products meet the preamble of claim 23 of the ’141 patent.

2. “a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water”

In response to Brita’s RFAs, PUR admitted that the Accused PUR Plus Containers constitute “a container having a source water reservoir that can hold source water and a filtered water reservoir that can hold filtered water.” (CX-0802C.0044-46 (PUR Obj. and Resp. to RFA Nos. 239, 241). Brita also provided documentary and testimonial evidence that supports PUR’s admission. (CX-0022.0001, 0007 (PUR Plus manual and photographs); Tr. (Rockstraw) at 481:6-482:11; *see also* CDX-0008C.0033-34 (demonstrating evidence pertaining to same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Containers practice this limitation of claim 23 of the ’141 patent.

3. "a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir"

PUR's product materials, reproduced in part below in Figure No. 5, demonstrate that the Accused PUR Plus Products include a cartridge that is capable of being inserted into a dispenser or pitcher such that it is in communication with both the source water reservoir and the filtered water reservoir to provide a path through which water can flow.

Figure No. 5: Photograph of PUR Plus Products Brochure

(CX-0022.0001; *see also id.* at 0008-0009 (PUR Plus photographs); Tr. (Rockstraw) at 481:6-482:11; CDX-0008C.0033-34 (demonstrating evidence pertaining to same).).

Respondents did not contest this. (RPBr. at 41-42; RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that

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the Accused PUR Plus Products practice this limitation of claim 23 of the '141 patent.

4. "a filter as recited in claim 1 disposed within the cartridge"

Brita presented testimony and documentary evidence that the Accused PUR Plus Products meet the limitation requiring "a filter as recited in claim 1 disposed within the cartridge." (Tr. (Rockstraw) at 481:6-482:11; CDX-0008C.0033-34 (demonstrating evidence pertaining to same); *see generally* Section X(B), *supra* (infringement of claim 1 by the Accused PUR Plus Products).). Figure No. 6 below is a photograph of the PUR Plus filter components.

Figure No. 6: Photograph of PUR Plus Filter Components

(CX-0022.0006.).

Respondents did not contest this. (RPBr. at 41-42; RRBr. at 6-7.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused PUR Plus Products practice this limitation of claim 23 of the '141 patent.

E. The Accused ZeroWater Products Practice Claim 1 of the '141 Patent

1. "A gravity-fed water filter, comprising"

In response to Brita's RFA, ZeroWater admitted that the Accused ZeroWater Filter is a "gravity-fed water filter," that is, water flows through the Accused ZeroWater Filter because of gravity. (CX-0800.0067-0068 (ZeroWater Obj. and Resp. to RFA No. 88); *see also* Tr. (Rockstraw) at 485:7-486:9, 486:16-22; CDX-0008C.0039, 41 (demonstrating evidence pertaining to same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter meets the preamble of claim 1 of the '141 patent.

2. "filter media including at least activated carbon and a lead scavenger"

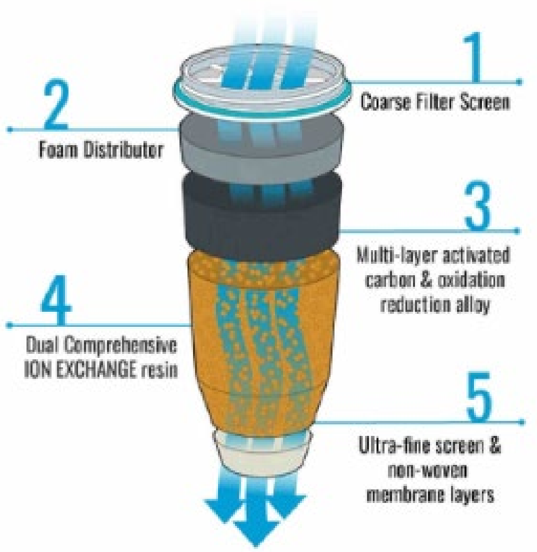
As discussed below, the Accused ZeroWater Filter also has a "filter media including at least ***activated carbon*** and a ***lead scavenger***," which ZeroWater did not dispute. (Tr. (Rockstraw) at 486:23-487:3.).

a) "activated carbon"

In response to Brita's RFAs, ZeroWater admitted that the Accused ZeroWater Filter contains activated carbon. (CX-0800.0068, 0088 (ZeroWater Obj. and Resp. to RFAs. 89, 113).). Moreover, Zero Technologies, LLC's President, Mr. Doug Kellam, confirmed that the Accused ZeroWater Filter includes activated carbon. (CX-0692C (Kellam Dep. Tr.) at 83:11-14; Tr. (Kellam) at 854:10-855:7.).

The following pictorial diagram, Figure No. 7, of ZeroWater's 5-stage filter shows that the Accused ZeroWater Filter has a filter media that includes an activated carbon layer and an ion exchange resin layer that removes metals.

Figure No. 7: Diagram of ZeroWater Filter Having an Activated Carbon Layer and an Ion Exchange Resin Layer



(CX-0565.0005; *see also* (CX-0023.0002-0003 (photographs of filter media).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the ’141 patent.

b) “lead scavenger”

ZeroWater admitted, and Mr. Kellam confirmed, that the Accused ZeroWater Filter includes an ion exchange resin, which removes or reduces lead from water. (CX-0800.0069-0070 (ZeroWater Obj. and Resp. RFAs 91-92); CX-0692C (Kellam Dep. Tr.) at 85:8-18.). Dr. Rockstraw testified that the ion exchange resin in ZeroWater’s filter is a lead scavenger under the adopted claim construction. (Tr. (Rockstraw) at 487:9-15; *Markman* Order at 20; *see also* Tr. (Rockstraw) at 485:7-486:1 (summarizing structure of Accused ZeroWater Filter).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the ’141 patent.

3. "wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula: FRAP = [V * f * c_e]/[L * 2]"

Based on, *inter alia* Mr. Nishijima's measurements for volume **V** (CX-0910C.0002 (V = 550)), flowrate **f** (CX-0911C.0001, 0005 (f = 11.8)), lead effluent **c_e** (CX-0912C.0001, 0004, 0005 (c_e = 0.14)) and ZeroWater's performance data sheet for lifetime **L** (CX-0570C.0001 (L = 20)), each of which are discussed in detail below, Dr. Rockstraw calculated the FRAP factor for the Accused ZeroWater Products, i.e., Accused ZeroWater Filters sold separately and those sold with the Accused ZeroWater Containers, to be 22.7, which is less than 350.

$$FRAP = \frac{[550 * 11.8 * 0.14]}{[20 * 2]} = 22.7$$

(Tr. (Rockstraw) at 489:8-17; CDX-0008C.0055-56 (calculating FRAP factor and summarizing evidence).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the '141 patent.

a) "where: V = volume of the filter media (cm^3)"

Brita's testing shows that the filter media of the Accused ZeroWater Filter has an approximate volume of 550 cm^3. (CX-0910C.0002 (volume measurement); *see also* Tr. (Rockstraw) at 487:24-488:4; CDX-0008C.0048 (same).). ZeroWater argued that this volume is inaccurate because it does not include all five stages of the Accused ZeroWater Filter. (RPBr. at 29-30; RRBr. at 9.). Specifically, ZeroWater contended that Brita's volume measurement excluded the screen and the foam distributor. (*Id.*). However, as Dr. Rockstraw explained, the screen and the foam distributor are not filter media because they have a different function, i.e., they do not filter water.

> Q. . . . Dr. Rockstraw, are you aware that -- of criticisms ZeroWater has made of your calculation of filter media volume?

A. I am.

Q. What is your understanding of their criticism of your calculation of filter media volume?

A. I've been criticized for not including some of the stages of their 5-stage filter in the calculation of the volume.

Q. And which stages did you not include in your calculation of the filter media volume?

A. By numbers, those would be stage 1 and stage 2, which are the ***screen on top of the filter cup*** and the ***foam distributor immediately beneath that***.

* * *

Q. Why did you not include those two components in your calculation of the filter media volume?

A. My experience with packed beds tells me that those are not filter media. The distributor's purpose is ***to assure that the incoming water is distributed evenly across the top of the bed so that you don't get channelling of the water preferentially through some portion of the bed***. If that happens, you're not using your media uniformly, and the filter life will not be what it's stated to be.

(Tr. (Rockstraw) at 489:20-491:1 (emphases added).).

Even if the volume of the screen and foam distributor were included, Dr. Rockstraw opined that the effect on the resulting FRAP factor would be trivial. (*Id.* at 490:4-17.). Brita noted that "[b]ased on the f, c_e, and L values for the Accused ZeroWater Products, a filter volume of nearly 10 times the measured value would be required to return a FRAP factor of more than 200." (CBr. at 43.). Brita provided evidence supporting its claim that "the screens and foam pad simply do not occupy this amount of additional volume." (*Id.* (citing CX-0565.0005 (diagram of ZeroWater Filter); CX-0175C.0011 (S&N Labs Report); CDX-0008C.0042 (illustrating filter media of Accused ZeroWater Filter).). ZeroWater did not rebut Dr. Rockstraw's opinion. (*See* RPBr. at 29-30; RRBr. at 9.).

Respondents' expert, Mr. Herman, used the same methodology as Brita when he

measured the volume of the alleged ZeroWater prior art filter. (Tr. (Herman) at 1194:17-1195:7.). That is, he measured only the activated carbon, ion exchange resin, and KDF treatment fluid when determining the volume of the alleged ZeroWater prior art product. (*Id.* at 1194:22-1195:2; *see also* RDX-0007C.0056.). Mr. Herman testified that he did not "have any reason to doubt" this was a correct way to calculate the volume of the filter media. (Tr. (Herman) at 1195:3-7.).

Respondents contended that inclusion of the screen and foam distributor is consistent with the adopted construction, and quoted the following from the *Markman* Order: "volume may also include the volume of membranes or other features associated with filtering techniques that may be present in the filter." (RRBr. at 9 (citing *Markman* Order at 8-14); *Markman* Order at 11.). Here, Respondents failed to present any evidence that the screen and foam distributor are indeed "associated with ***filtering*** techniques." As Dr. Rockstraw testified, and discussed above, these components have a different function.

Respondents also asserted that Dr. Rockstraw "acknowledged 'filter media' is not limited to only 'activated carbon and a lead scavenger,' and that other of the five stages could filter ***contaminants***." (RRBr. at 9 (emphasis added) (citing Tr. (Rockstraw) at 583:9-16, 584:14-23.). Respondents' assertion is misleading. Dr. Rockstraw's full testimony is replicated below:

> Q. . . . Dr. Rockstraw, wouldn't you agree that some of the three stages that Mr. Nishijima failed to measure are associated with filtering techniques in the ZeroWater filter?
>
> A. Well, if you have chunks in your tap water, the initial screen would take out those chunks and that would be considered filtration, but it really has nothing to do with lead.
>
> Q. Is there anything in here that limits filtering techniques to lead?
>
> A. Well, when I read claim 1 in context of the '141 patent, it's referring me to lead separation, yes.

(Tr. (Rockstraw) at 583:9-20.).

Dr. Rockstraw's testimony reveals his understanding of filtration, in the context of the '141 patent, to mean the techniques associated with filtering "contaminants," such as lead, and not filtration in general, i.e., "chunks." Thus, he was not necessarily acknowledging that the other stages of the Accused ZeroWater Filter could be "associated with filtering techniques," as disclosed in the '141 patent, and as Respondents contended.

Respondents also pointed to the language in claim 1 reciting a filter media that "include[es] ***at least*** activated carbon and a lead scavenger" to support the same proposition. (RRBr. at 9.). However, Respondents failed to provide evidence or argument explaining why components that do not filter, as that term is used in the '141 patent, should be included in the claimed volume measurement just because the claim recites this language. (*Id.*). Thus, Dr. Rockstraw's testimony upon which Respondents rely does not support Respondents' assertion.

In their Pre-Hearing Brief, Respondents argued that the Accused ZeroWater Filter does not practice this limitation because the '141 patent purportedly disclaims filters having a volume greater than 400 cm^3. (RPBr. at 29.). However, as Brita correctly noted, that argument was squarely rejected in the *Markman* Order issued in this Investigation. (*Markman* Order at 13-14 (declining to read a maximum volume limitation into the claims); CBr. at 43.).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the '141 patent.

b) "f = average filtration unit time over lifetime L (min/liter)"

After testing the filtration unit time for 72 of 76 filtered liters and averaging those values, the average time that it takes to filter one liter of water over the lifetime of the Accused ZeroWater Filter (i.e., the average filtration unit time over lifetime) is approximately 11.8

minutes/liter. (Tr. (Rockstraw) at 487:24-488:4; CX-0911C.0001, 0005 (filtration unit time measurements); CDX-0008C.0049 (summarizing filtration unit time measurements).). Dr. Rockstraw testified that he used the same methodology for determining the average filtration unit time for the Accused ZeroWater Filter as for the Accused PUR Plus Filter. (Tr. (Rockstraw) at 487:24-488:4.).

During the Hearing, ZeroWater's counsel questioned Mr. Nishijima about the "2-fill" notation on the filtration unit time measurements in CX-0911C. (Tr. (Nishijima) at 376:3-377:23.). During that questioning, counsel suggested that Brita had actually filtered 77 liters rather than 76. (*Id.*). Mr. Nishijima later clarified that only 76 liters had been filtered. (Tr. (Nishijima) at 414:20-416:5.). As discussed above in Section IX(A)(4), the "2-fill" notation indicates that the technician forgot to empty the prior filtered liter from the lower filtered water reservoir before adding the next liter. It does not indicate that an extra liter was filtered. (*Id.*). However, even if one additional liter had been filtered, ZeroWater did not present any evidence to support a finding that it would have made any difference with respect to whether the Accused ZeroWater Filter has a FRAP factor below at least about 200.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the '141 patent.

c) "c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter"

Brita's testing showed that the effluent lead concentration at the end of the filter lifetime for the Accused ZeroWater Filter is approximately 0.14 µg/L. (CX-0912C.0005 ("3-ZeroWater-Pb, eff, 100%, 6-15-2021" effluent sample having a lead concentration of 0.14 ppb at 100% lifetime); CBr., App. A at 2; *see also* Tr. (Rockstraw) at 487:24-488:4; CDX-0008C.0050

(summarizing lead effluent measurements).). This is consistent with NSF testing that confirmed a lead effluent of equal to or less than 1.7 µg/L at end of lifetime. (CX-0581C.0003 (NSF Test Report); CDX-0008C.0051 (summarizing NSF certification testing measurements).).

Respondents asserted that "the evidence likely shows that the c_e value used by Brita was taken after the lifetime (L) was reached." (RRBr. at 9.). In support of this assertion, Respondents stated the following:

> Mr. Nishijima repeatedly testified that because two liters were passed through the tested ZeroWater filter at liter 53, his c_e measurement was made after 77 liters of water had passed through the filter as opposed to the 76 liters Brita asserts matches up with the lifetime (L) of the Accused ZeroWater Products. After a lunch break, Mr. Nishijima sought to change his prior testimony, which leaves the record unclear as to what he actually did when testing the Accused ZeroWater Products. When his testimony and credibility is properly weighed, Mr. Nishijima's testimony shows that Brita has not adequately measured the C_e [sic] of the Accused ZeroWater Products and thus fails to show infringement.

(*Id.* (citing Tr. (Nishijima) at 375:9-23, 377:7-23; 376:3-22, 424:8-20).).

However, as discussed above with the "average filtration unit time over lifetime L" limitation and Section IX(A) with respect to testing, Mr. Nishijima clarified that although the "2-fill" notation indicates that two (2) liters had been passed, 76, and not 77, liters were filtered. (Tr. (Nishijima) at 414:20-416:5.). Thus, Respondents' assertion "the c_e value used by Brita was taken after the lifetime (L) was reached" is incorrect. Moreover, as Brita noted, neither Respondents as a group, or ZeroWater on its own, put forward any rebuttal expert testimony on this issue. (*See* CPBr. at 20; RPBr. at 29-30 (no citation to expert testimony); RRBr. at 9 (same).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the '141 patent.

d) "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"

The Accused ZeroWater Filter has a validated lifetime of 20 gallons, that is, the total number of gallons of water that ZeroWater has validated can be filtered before the filter is replaced. (Tr. (Rockstraw) at 488:5-7.). The Accused ZeroWater Filter is NSF/ANSI 53 certified for lead removal of at pH 8.5 for 20 gallons. (CX-0570C.0001 (claiming NSF/ANSI 53 certification for lead removal at pH 8.5); CX-0570C.0001 (ZeroWater Performance Data Sheet showing lifetime of 20 gallons and that the product has an NSF/ANSI 53 certification for lead reduction at pH 8.5); Tr. (Rockstraw) at 488:8-19.).

ZeroWater's NSF/ANSI 53 certification indicates that it reduces lead below 5 ppb for 200% of filter lifetime, which is below the 10 ppb threshold required to be certified for lead reduction under the NSF/ANSI 53 (2007) standard. (Tr. (Herman) at 1174:15-1175:9; CX-0690C (Franks Dep. Tr.) at 52:17-21 (effluent lead concentration threshold under the current NSF/ANSI 53 standard is 5 ppb).). Therefore, the Accused ZeroWater Filter is validated for a capacity of 20 gallons. (Tr. (Rockstraw) at 488:5-19; CDX-0008C.0052 (explaining the lifetime is 20 gallons for the Accused ZeroWater Filter).).

ZeroWater also produced NSF certification testing data for the accused filter in this Investigation evidencing a 20-gallon lifetime. (Tr. (Rockstraw) at 489:2-7; CX-0581C.0002 (NSF Test Report); CDX-0008C.0054 (summarizing NSF testing data).).

Respondents contended that the 20-gallon capacity was determined by using the current, more stringent NSF 53 challenge water (which includes a lower maximum effluent lead concentration of 5 ppb instead of NSF/ANSI 53 (2007)'s 10 ppb), and not NSF/ANSI 53 (2007). (RRBr. at 8 (citing CX-0570C.0001).). Based on Mr. Nishijima's testimony acknowledging that the challenge water for infringement testing did not comply with NSF/ANI 53 (2007),

Responded asserted that "Brita has no certifications or testing . . . that support the 20-gallon value used by Brita to calculate the FRAP value for the Accused ZeroWater Products." (*Id.* (citing Tr. (Nishijima) at 351:9-353:10; CBr. at 43-44, 46).). Brita's assertion is not persuasive. To the contrary, that the Accused ZeroWater Filter is NSF/ANSI 53 certified for lead removal under the current standard, which is ***more stringent*** than the 2007 standard, overwhelmingly supports the 20-gallon value Brita used.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices this limitation of claim 1 of the '141 patent.

F. The Accused ZeroWater Products Practice Claims 2 and 5 of the '141 Patent

1. Claim 2: "The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200"

As discussed above in Section X(E)(3) the Accused ZeroWater Filter achieves a FRAP factor of approximately 22.7. (Tr. (Rockstraw) at 491:2-10; CDX-0008C.0057.). Moreover, Respondents did not present any separate rebuttal arguments with respect to this claim. (RPBr. at 29-30; RRBr. at 7-10.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Filter practices the additional limitation recited in claim 2 of the '141 patent.

2. Claim 5: "The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 12 minutes per liter"

As discussed above in Section X(E)(3)(b), the data indicates that average filtration unit time over filter lifetime for the Accused ZeroWater Filter is approximately 11.8 minutes/liter. (Tr. (Rockstraw) at 491:11-17; CX-0911C.0001, 0005 (filtration unit time measurements); CDX-

0008C.0058 (summarizing average filtration unit time measurements).). Therefore, the Accused ZeroWater Filter has an "average filtration unit time (f) [that] is less than about 12 minutes per liter." (*Id.*).

Respondents pointed out that Dr. Rockstraw discarded four flow rate measurements from Mr. Nishijima's testing; the measurements at liters 6 and 53 because of alleged timing or refill errors, and two "missed" measurements at liters 29 and 64. (RRBr. at 10 (citing Tr. (Rockstraw) at 586:11-13; CDX-0008C.0049; CX-0911C.0001, 0005).). Respondents argued that had liters 6 and 53 been included in the average flowrate, such that 74 of 76 liters were measured, rather than the 72 of 76 filters liters that Dr. Rockstraw considered, this would result in a flowrate of 12.37 minutes/liter, which is outside the scope of claim 5. (*Id.* (citing Tr. (Rockstraw) at 588:3-7, 589:7-23; RDX-0014C.0008; CX-0911C.0001, 0005).).

Dr. Rockstraw provided persuasive testimony that clarified why the values were excluded. He explained that the two (2) values were excluded because they were the result of an erroneous measurement (e.g., the measurement was either the result of a timer error or taken with a liter of water already in the filtered reservoir) and, thus, were outliers (nearly four times longer than the average). (*Id.* at 588:8-589:4; CX-0911C.0001, 0005 (filtration unit time measurements).). Dr. Rockstraw also testified that including these measurements in the average filtration unit time would introduce error and would not provide a representative measurement. (Tr. (Rockstraw) at 587:25-589:4.). Moreover, as Brita noted, neither Respondents as a group, or ZeroWater on its own, offered rebuttal expert testimony/evidence on this issue. (*See* CPBr. at 20; RPBr. at 29-30 (no citation to expert testimony); RRBr. at 10 (same).). On Respondents' part, there was a failure of proof.

For the reasons discussed above, Brita has proven by a preponderance of evidence that

the Accused ZeroWater Filter practices the additional limitation recited in claim 5 of the ’141 patent.

G. The Accused ZeroWater Products Practice Claim 23 of the ’141 Patent

1. “A gravity-flow system for filtering water, comprising”

The combination of Accused ZeroWater Containers and ZeroWater Filter (“Accused ZeroWater Products”) constitute “[a] gravity-flow system for filtering water,” because, as ZeroWater admitted in response to Brita’s RFA, the Accused ZeroWater Filter is gravity-fed. (CX-0800.0067-68 (ZeroWater Obj. and Resp. to RFA No. 88); *see also* Tr. (Rockstraw) at 493:10-494:5; CDX-0008C.0059-60 (illustrating the Accused ZeroWater Products and summarizing evidence relied upon).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Products meet the preamble of claim 23 of the ’141 patent.

2. “a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water”

In response to Brita’s RFA, ZeroWater admitted that the Accused ZeroWater Products include a reservoir that can hold filtered water separate from a space that can hold water that has not yet passed through the filter. (CX-0800.0089-90 (ZeroWater Obj. and Resp. to RFA No. 115).). ZeroWater also admitted that the Accused ZeroWater Products include the Accused ZeroWater Containers that have: (1) an upper reservoir for water that has not yet passed through the filter in the Accused ZeroWater Container; and (2) a lower reservoir for filtered water. (CX-0800.0090 (ZeroWater Obj. and Resp. to RFA No. 116); *see also* CX-0016.0001 (ZeroWater website).). The following photograph, Figure No. 8, shows the upper and lower reservoirs of the ZeroWater pitcher:

Public Version

Figure No. 8: Photograph of ZeroWater Pitcher

(CX-0023.0006 (photograph showing upper and lower reservoir).).

For the reasons discussed, Brita has proven by a preponderance of evidence that the Accused ZeroWater Products meet this limitation of claim 23 of the '141 patent.

3. "a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir"

The Accused ZeroWater Products include "a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir." (Tr. (Rockstraw) at 493:10-494:5.). The following photographs, Figure No. 9, show that when the cartridge containing the Accused ZeroWater Filter is placed in the ZeroWater pitcher, the cartridge is in communication with both reservoirs:

Figure No. 9: Photographs of ZeroWater Cartridge and Pitcher

(CX-0023.0005-0006; CDX-0008C.0059 (same).).

Respondents did not contest this. (RPBr. at 29-30; RRBr. at 7-10.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Products meet this limitation of claim 23 of the ’141 patent.

4. “a filter as recited in claim 1 disposed within the cartridge”

The Accused ZeroWater Products have “a filter as recited in claim 1 disposed within the cartridge.” (Tr. (Rockstraw) at 493:10-494:5; CDX-0008C.0059-60 (showing Accused ZeroWater Filter and summarizing evidence relied upon). Figure No. 10, below, is a photograph of the ZeroWater cartridge.

Figure No. 10: Photograph ZeroWater Cartridge

(CX-0023.0005.).

Respondents did not contest this. (RPBr. at 29-30; RRBr. at 7-10.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed, Brita has proven by a preponderance of evidence that the Accused ZeroWater Products meet this limitation of claim 23 of the '141 patent.

H. ZeroWater Redesigned Products Practice Claims 1, 2, 5, and 23 of the '141 Patent

The Accused ZeroWater Redesign Filters have model numbers ZP-006-A, ZP-006-B, ZP-006-C, and ZP-006-D. (*See* CX-0943; RPBr. at 31.). During the Hearing, these filters were referred to as Redesign A, B, C, and D, respectively.

Zero Technologies, LLC's President, Mr. Kellam, confirmed that there are no differences between the alleged redesigns and the originally accused filters.

> Q. . . . So there are no differences in the filter composition between Gen 2 and A through D, right?
>
> A. That's correct.
>
> Q. There are no differences in the volume of the filter between Gen 2 and A through D.
>
> A. That's correct.
>
> Q. There's no difference in the performance of Gen 2 versus A through D.

A. That's correct.

Q. There's no difference in the function of the product Gen 2 versus A through D.

A. That's correct.

Q. So these products are identical, right?

A. The ***product themselves are identical***, yes.

(Tr. (Kellam) at 914:1-14 (emphasis added); *see also* CX-0692C (Kellam Dep. Designation) at 159:4-19 ("Q. And what's the difference between your current products and the alternative or redesign products? A. ***Nothing***.") (emphasis added); Tr. (Rockstraw) at 484:18-485:1 (explaining that the products are physically identical); CDX-0008C.0037.).

Additionally, ZeroWater's own counsel stated that with respect to the "four new models (ZP-006-A, ZP-006-B, ZP-006-C, and ZP-006-D)[,] . . . "[t]he structure of the filter and pitcher in these models are unchanged from the accused products." (CX-0943 (Apr. 22, 2022 Brandyberry letter); CDX-0008C.0038 (summarizing letter).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused ZeroWater Redesign Filters practice claims 1, 2 and 5, and the Accused ZeroWater Redesign Filters with their corresponding pitchers ("Accused ZeroWater Redesign Products") practice 23 for the same reasons discussed above with respect to the Accused ZeroWater Filters and Accused ZeroWater Products. (*See* Tr. (Rockstraw) at 485:2-8 ("Q. If the redesigned filters are identical physically, chemically to the original accused filters, how does that impact your opinion with respect to infringement? A. The redesigned filters would be equally applicable to any analysis I do of the original filters.").).

Respondents argued that the Accused ZeroWater Redesign Filters do not claim a lifetime (L) because that information has removed the packaging for these products. (RPBr. at 30-31; RRBr. at 10.). Brita did not dispute that the packaging for the Accused Redesign Products differ from the packaging of the Accused ZeroWater Products. (CPBr. at 26; CBr. at 50.).

Respondents pointed out that the claim limitation itself includes the requirement that a lifetime in gallons is "claimed by a manufacturer or seller." (RRBr. at 12 (citing JX-0022 at cl. 1).). Respondents also argued that the '141 patent "affirms that what is claimed on product packaging is paramount when determining whether a product possesses a Lifetime of the Asserted Claims." (*Id.* at 13 (citing JX-0022.0043).).

Again, Respondents did not dispute that the Accused ZeroWater Redesign Filters are identical to the existing filter, and acknowledged that the "performance" and "function" of the Accused ZeroWater Redesign Filters are identical to the existing Accused ZeroWater Filter. (Tr. (Kellam) at 913:4-914:14.). Given Respondents' concession, and with all other parameters being ***identical***, one could reasonably conclude, and it least draw the evidentiary inference, that the lifetime of the Accused ZeroWater Redesign Filters would also be the same as the Accused ZeroWater Filter.

Additionally, that the lifetime for the Accused ZeroWater Redesign Filters is not expressly disclosed on the packaging does not take them out of the scope of claim 1. Although the claim explicitly recites a lifetime "claimed by a manufacturer or seller," other than a disclosure in the specification that "[t]ypically these claims are present on the product packaging in the form of instructions to a consumer," there is nothing in the claim or in the specification ***that requires*** the "claim[] by the manufacturer or seller" to be made ***only*** on a product's packaging. Respondents' acknowledgment that the Accused ZeroWater Redesign Filters have the same "performance" and "function" as the Accused ZeroWater Products can be viewed as, and is understood here to be, an admission that related qualities of the filter, such as the lifetime of the filter, is the same.

For the reasons discussed above in Sections X(E)-(G) with respect to the Accused

ZeroWater Products, Brita has proven by a preponderance of evidence that the Accused ZeroWater Redesign Filters practice claims 1, 2, 5, and 23 of claim 23 of the ’141 patent.

I. The Accused LifeStraw Products Practice Claim 1 of the ’141 Patent

1. “A gravity-fed water filter, comprising”

In response to Brita’s RFA, LifeStraw admitted that the Accused LifeStraw Home Filter is a “gravity-fed water filter.” (CX-0803C.0005 (LifeStraw Obj. and Resp. to RFA No. 380); CDX-0008C.0086 (excerpting RFA).). Brita also provided documentary evidence supporting LifeStraw’s admission. (CX-0035 (LifeStraw User Manual); CX-0036 (LifeStraw User Manual); CX-0274C.0051 (LifeStraw Evidence Dossier) (stating, “Physical Description of Sample: Gravity Filter”).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter meets the preamble of claim 1 of the ’141 patent.

2. “filter media including at least activated carbon and a lead scavenger”

As discussed below, the Accused LifeStraw Home Filter has a “filter media including at least ***activated carbon*** and a ***lead scavenger***” as recited in claim 1. (Tr. (Rockstraw) at 504:5-15; CX-0024.0004, 0006 (photographs of Accused LifeStraw Home Filter); CDX-0008C.0087 (identifying activated carbon and lead scavenger in Accused LifeStraw Filter).).

a) “activated carbon”

In response to Brita’s RFA, LifeStraw admitted that the Accused LifeStraw Home Filter contains activated carbon. (CX-0803C.0007 (LifeStraw Obj. and Resp. RFA No. 384); CX-0175C.0005; CX-0774C.0038 (LifeStraw Obj. and Resp. to Interrog. 29) [redacted]

Additionally, Brita presented documentary evidence of LifeStraw’s admission. (CX-0175C.0005

(S&N Labs Report); CX-0151C (S&N Labs LifeStraw Data); *see also* CDX-0008C.0102 (summarizing evidence of infringement).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the ’141 patent.

b) “lead scavenger”

In response to Brita’s RFA, LifeStraw admitted that the Accused LifeStraw Home Filter also has an ion exchange resin, which is a lead scavenger because it removes or reduces lead in water. (CX-0803C.0008-0009 (LifeStraw Obj. and Resp. RFA 388); *Markman* Order at 20.). LifeStraw also explained that the second stage of the filter “comprises activated carbon combined with an ion exchange resin in the form of fibers, which adsorbs chemicals and heavy metals.” (CX-0774C.0038 (LifeStraw Obj. and Resp. to Interrog. 29).). Dr. Rockstraw testified that “[l]ead is a heavy metal.” (Tr. (Rockstraw) at 504:24-505:5.). Moreover, LifeStraw’s Director of Engineering, Mr. Jean-Luc Madier, confirmed that [redacted]. (CX-0699C (Madier Dep. Tr.)[52] at 46:1-8; *see also* Tr. (Rockstraw) at 505:6-12; CX-0038.0002 (LifeStraw website admitting the Accused LifeStraw Home Filter includes an ion exchange resin that reduces lead).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the ’141 patent.

[52] At the time of his deposition on May 17, 2022, Mr. Jean-Luc Madier was Director of Engineering at Respondent LifeStraw. (CX-0699C (Madier Dep. Tr.) at 12:1-8.).

3. "wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula: FRAP = [V * f * c_e]/[L * 2]"

Based on, *inter alia* Mr. Nishijima's measurements for volume **V** (CX-0910C.0001 (V = 100)), flowrate **f** (CX-0911C.0003, 0007, 0010, 0011 (f = 6.1)), lead effluent **c_e** (CX-0912C.0001, 0004-06 (c_e = 0.3)) and LifeStraw's Home Testing Summary for lifetime **L** (CX-0283C.0004 (L = 40)), each of which are discussed in detail below, Dr. Rockstraw calculated the FRAP factor for the Accused LifeStraw Home Filter to be 2.3, which is less than 350.

$$FRAP = \frac{[V * f * c_e]}{[L * 2]} = \frac{[100 * 6.1 * 0.3]}{[40 * 2]} = 2.3$$

(Tr. (Rockstraw) at 507:23-508:4; CDX-0008C.0101-102 (calculating FRAP factor and summarizing evidence).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the '141 patent.

4. "where: V = volume of the filter media (cm^3)"

Brita's testing shows that the filter media of the Accused LifeStraw Home Filter has a volume of approximately 100 cm^3: the membrane microfilter has an approximate volume of 50 cm^3, and the activated carbon and ion exchange filter has an approximate volume of 50 cm^3. (CX-0910C.0001C (volume testing); *see also* Tr. (Rockstraw) at 506:2-7; CDX-0008C.0093 (summarizing volume measurement).).

Respondents did not contest these volume measurements. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the '141 patent.

5. “f = average filtration unit time over lifetime L (min/liter)”

After testing the filtration unit time for 145 of 152 filtered liters and averaging those values, Brita determined the average time that it takes to filter one liter of water over the filter usage lifetime of the Accused LifeStraw Home Filter (i.e., average filtration unit time over the lifetime) is approximately 6.1 minutes/liter. (CX-0911C.0003, 0007, 0010, 0011 (flow rate testing); *see also* Tr. (Rockstraw) at 506:8-24; CDX-0008C.0094 (same).). [redacted] (CX-0282C.0003 ([redacted]); CDX-0008C.0095 (summarizing [redacted]).). Dr. Rockstraw also explained that 145 out of 152 liters or 95.4% of all filtered liters was sufficient to provide a statistically significant average. (Tr. (Rockstraw) at 506:12-24.).

Respondents did not dispute this measurement. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the ’141 patent.

6. “c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter”

Brita’s testing demonstrates that the effluent lead concentration at the end of the filter lifetime for the Accused LifeStraw Home Filter is approximately 0.3 µg/L. (CX-0912C.0006 (“9-Lifestraw, eff, 152L, 8-4-2021” sample having a lead concentration of 0.26 ppb at 100% lifetime); CBr., App. A at 2; *see also* Tr. (Rockstraw) at 506:25-507:3.). This is consistent with

the LifeStraw Home Evidence Dossier, which provides testing for "Lead reduction following NSF/ANSI 53 Standard" and indicates that effluent lead concentration at the end of lifetime L for lead reduction at pH 8.5 was below the threshold limit of 5.0 µg/L. (CX-0274C.0019 (LifeStraw Home Evidence Dossier).).

Respondents did not dispute this volume measurement. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the '141 patent.

7. "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"

In response to Brita's RFA, LifeStraw admitted that the Accused LifeStraw Home Filter has a validated lifetime of 40 gallons, the total number of gallons of water that LifeStraw has validated can be filtered before the Accused LifeStraw Home Filter is replaced. (CX-0803C.0013 at RFA No. 402 (admitting "that the manufacturer claimed lifetime of the LifeStraw Home Water Filters is 40 gallons); CX-0018.0001-03 (LifeStraw website indicating "[t]he activated carbon + ion exchange filter lasts 40 gallons (2 months)"); Tr. (Rockstraw) at 507:11-22.). The Accused LifeStraw Home Filter is also certified under NSF/ANSI 53 to remove lead at pH 8.5 for 40 gallons and is therefore validated for this capacity. (CX-0284C.0002 (product description evidencing lifetime of 40 gallons and NSF/ANSI 53 certification for lead removal).). LifeStraw's NSF/ANSI 53 certification indicates that it reduces lead below 5 ppb for 200% of filter lifetime, which is well below the 10 ppb threshold required to be certified for lead reduction under the NSF/ANSI 53 (2007) standard. (Tr. (Herman) at 1174:15-1175:9; CX-0690C (Franks Dep. Tr.) at 52:17-21 (effluent lead concentration threshold under the current

NSF/ANSI 53 standard is 5 ppb).

Additionally, the Accused LifeStraw Home Filter's product packaging reports that it has NSF/ANSI 53 lead reduction certification and indicates the "LifeStraw filter has two elements, the membrane microfiber has a lifetime of 264 gallons, the LifeStraw activated carbon and ion exchange filter has a lifetime of 40 gallons." (Tr. (Rockstraw) at 507:11-22; CX-0284C.0002 (LifeStraw Home Description); CDX-0008C.0098.). Because at least one component of the filter system must be replaced every 40 gallons, Dr. Rockstraw testified that the filter usage lifetime of the Accused LifeStraw Home Filter when assembled and used as intended is 40 gallons. (Tr. (Rockstraw) at 507:11-22; *see also* CX-0010.0089 (requiring that the claimed lifetime be the lowest reduction capacity or service life that has been verified through testing to NSF/ANSI 53).

Respondents did not contest this measurement. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices this limitation of claim 1 of the '141 patent.

J. The Accused LifeStraw Products Practice Claims 2-5 of the '141 Patent

1. Claim 2: "The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200."

As discussed above in Section X(I) with respect to claim 1, the Accused LifeStraw Home Filter achieves a FRAP factor of approximately 2.3. (Tr. (Rockstraw) at 508:5-10; CDX-0008C.0103 (calculating FRAP).).

LifeStraw did not contest this measurement or provide any separate rebuttal arguments with respect to claim 3 in Respondents' Pre-Hearing Brief or Post-Hearing Reply Brief. (*See*

RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices the additional limitation recited in claim 2 of the ’141 patent.

2. Claim 3: "The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3."

As discussed above in Section X(I)(4) with respect to claim 1, the volume of the filter media of the Accused LifeStraw Home Filter is approximately 100 cm^3, which is less than 300 cm^3. (CX-0910C.0001 (volume testing); *see also* Tr. (Rockstraw) at 508:11-19; CDX-0008C.0104 (summarizing measured volume).

LifeStraw did not contest this measurement or provide any separate rebuttal arguments with respect to claim 3 in Respondents' Pre-Hearing Brief or Post-Hearing Reply Brief. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices the additional limitation recited in claim 3 of the ’141 patent.

3. Claim 4: "The water filter as recited in claim 3, wherein the volume of the filter media (V) is less than about 150 cm^3."

As discussed above in Sections X(I)(4) and X(J)(2) with respect to claims 1 and 3, Brita's testing demonstrates that the volume of the filter media of the Accused LifeStraw Home Filter is approximately 100 cm^3, which is less than 150 cm^3. (CX-0910C.0001 (volume testing).).

LifeStraw did not contest this measurement or provide any separate rebuttal arguments

with respect to claim 4 in Respondents' Pre-Hearing Brief or Post-Hearing Reply Brief. (*See* RPBr. at 32-36; RRBr. at 18-19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices the additional limitation recited in claim 4 of the '141 patent.

4. Claim 5: "The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 12 minutes per liter."

As discussed in Section X(I)(5) above with respect to claim 1, the data indicates that average filtration unit time over filter lifetime for the Accused LifeStraw Home Filter is approximately 6.1 minutes/liter. (CX-0911C.0003, 0007, 0010, 0011 (flow rate testing); *see also* Tr. (Rockstraw) at 508:20-509:2; CDX-0008C.0105 (summarizing flow rate measurements). Moreover, [redacted] (CX-0282C.0003 ([redacted]).).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Accused LifeStraw Home Filter practices the additional limitation recited in claim 5 of the '141 patent.

XI. TECHNICAL PRONG OF THE DOMESTIC INDUSTRY REQUIREMENT

A. Legal Standard

A complainant in a patent-based Section 337 investigation must demonstrate that it is practicing or exploiting the patents at issue. *See* 19 U.S.C. § 1337(a)(2) and (3); *Certain Microsphere Adhesives, Process for Making Same, and Prods. Containing Same, Including Self-*

Stick Repositionable Notes, Inv. No. 337-TA-366, Comm'n Op. at 8, Pub. No. 2949 (U.S.I.T.C. Jan. 16, 1996) ("*Microsphere Adhesives*"). "In order to satisfy the technical prong of the domestic industry requirement, it is sufficient to show that the domestic industry practices any claim of that patent, not necessarily an asserted claim of that patent." *Certain Ammonium Octamolybdate Isomers*, Inv. No. 337-TA-477, Comm'n Op. at 55 (U.S.I.T.C. Jan. 5, 2004) ("*Certain Isomers*").

The test for claim coverage for the purposes of the technical prong of the domestic industry requirement is the same as that for infringement. *Certain Doxorubicin and Preparations Containing Same*, Inv. No. 337-TA-300, Initial Determination at 109, 1990 WL 710463 (U.S.I.T.C. May 21, 1990), *aff'd*, Views of the Commission at 22 (October 31, 1990) ("*Doxorubicin*"). "First, the claims of the patent are construed. Second, the complainant's article or process is examined to determine whether it falls within the scope of the claims." *Id.* The technical prong of the domestic industry can be satisfied either literally or under the doctrine of equivalents. *Certain Dynamic Sequential Gradient Devices and Component Parts Thereof*, Inv. No. 337-TA-335, Initial Determination at 44, Pub. No. 2575 (U.S.I.T.C. Nov. 1992).

B. The DI Products Practice Claim 1 of the '141 Patent

In their Post-Hearing Reply Brief, Respondents' ***sole*** argument for lack of domestic industry is that "if [the] '141 Patent requires NSF 53 (2007), then Brita has failed to show the technical prong of domestic industry" because "Brita's testing was not in compliance with NSF 53 (2007) protocol for the majority of the tests." (RRBr. at 19.). Even if, *arguendo*, that is the case, Respondents' contention is misguided and incorrect.

As a result of the *Markman* proceedings, it was determined that while the '141 patent incorporates by reference the NSF/ANSI 53 (2007) standard, the patent does ***not require*** the

standard. (*See* Section VIII(B), *supra*; *see also Markman* Order at 16 ("the standard is not required as the method of 'validation' because of the permissive language used in the specification of the '141 patent") (citing JX-0022 at 26:22 (stating that the standard "may" be used for FRAP testing)).). Respondents did not raise other arguments for each specific claim limitation.

For the reasons discussed below, Brita LongLast Products (Brita LongLast Filters and compatible Brita containers sold with Brita LongLast Filters) and the Brita LongLast+ Products (Brita LongLast+ Filters and compatible Brita containers sold with Brita LongLast+ Filters) (collectively, the "DI Products") practice every limitation of claims 1-6 and 23 of the '141 patent. (Tr. (Rockstraw) at 465:11-15; CDX-0008C.0007 (summarizing opinions).).

1. "A gravity-fed water filter, comprising"

Brita presented documentary and testimonial evidence that the Brita LongLast and LongLast+ Filters are "gravity-fed water filter[s]." (CX-0012C (Brita LongLast Packaging); CX-0013C (Brita LongLast+ Packaging); CX-0020.0002 (LongLast+ Instructions); Tr. (Rockstraw) at 511:4-8.).

Respondents did not contest this. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters meet the preamble of claim 1 of the '141 patent.

2. "filter media including at least activated carbon and a lead scavenger"

For the reasons discussed below, the Brita LongLast and LongLast+ Filters include "filter media including at least ***activated carbon*** and a ***lead scavenger***." (Tr. (Rockstraw) at 511:10-15;

CX-0020.0004-0005 (photographs of LongLast+ Filter); CX-0021.0002-0003 (photographs of LongLast Filter); CDX-0008C.0111 (annotating photographs of DI Products).).

a) "activated carbon"

S&N Labs' chemical and compositional analysis of the filter media of the Brita LongLast Filter and LongLast+ Filters indicate that both contain activated carbon.[53] (CX-0175C.0013 (identifying activated carbon within pleated filter cartridge for LongLast); *id.* at 0003 (same for LongLast+); *see also* CX-0155C (S&N Labs LongLast Data); CX-0150C (S&N Labs LongLast+ Data); CX-0032.0002 (LongLast+ filter media).). This was confirmed by testimony from [redacted] at 434:9-11 (testifying that the Brita LongLast and LongLast+ Filters contain activated carbon).).[54]

Respondents did not dispute this. (*See* RPBr. at 42; RRBr. at 19.). Accordingly, any argument Respondents may try to make on this claim limitation/issue is deemed abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the '141 patent.

b) "lead scavenger"

The S&N Labs' analysis confirmed that both the Brita LongLast and LongLast+ Filters have [redacted], which Dr. Rockstraw testified "are known to scavenge lead from water." (CX-0175C.0003, 0013 (identifying [redacted] within pleated filter cartridges); CX-0150C (S&N Labs LongLast+ Data); CX-0155C (S&N Labs LongLast Data); Tr. (Rockstraw) at

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[53] S&N Labs, an independent third-party laboratory, performed chemical and composition analysis of the LongLast filter media. (*See* CX-0008C.0112; Tr. (Rockstraw) at 511:13-22.).

[54] When he testified during the Hearing, [redacted] where he manages and oversees the day-to-day operations of [redacted]. (*See* Confidential Ex. 130 to Compl.).

511:16-22.). Mr. Barrillon, Brita's fact witness, also testified that there is a [redacted] in the filter media of the Brita LongLast and LongLast+ Filters and that removing lead from water is "its sole purpose." (Tr. (Barrillon) at 434:12-22; CDX-0008C.0120 (summarizing evidence for claim 1).). Because [redacted] removes or reduces lead from water, it is a lead scavenger. (*See Markman* Order at 20.).

Respondents did not contest this. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument that Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the '141 patent.

3. "wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula: FRAP = [V * f * c_e]/[L * 2]"

Based, *inter alia*, on Mr. Nishijima's measurements for volume **V** (CX-0910C.0004 (V = 48 for both)), flowrate **f** (CX-0911C.0016-0018, 0023-0024, 0026, 0028-0033 (f = 3.1 for LongLast, 2.4 for LongLast+)), lead effluent $\mathbf{c_e}$ (CX-0912C.0002, 0003, 0007-0009 (c_e = 0.04 for LongLast, 0.1 for LongLast+)) and Brita's product packaging for lifetime **L** (CX-0012C, CX-0020.0007, CX-0013C (L = 120 for both)), which are discussed in detail below, Dr. Rockstraw calculated the FRAP factor for the LongLast and LongLast+ Filters and compatible Brita containers sold with the LongLast and LongLast+ Filters as follows:

For the Brita LongLast Products:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]} = \frac{[48 * 3.1 * 0.04]}{[120 * 2]} = 0.02$$

For the Brita LongLast+ Products:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]} = \frac{[48 * 2.4 * 0.1]}{[120 * 2]} = 0.05$$

(Tr. (Rockstraw) at 514:2-9; CDX-0008C.0119-0120 (calculating FRAP and summarizing evidence).).

Both products have FRAP factors of less than 350, which Respondents did not dispute. (*See* RPBr. at 42; RRBr. at 19.). Accordingly, any argument Respondents may try to make on this claim/issue has been abandoned, withdrawn, and/or waived any under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the '141 patent.

a) "where: V = volume of the filter media (cm^3)"

Brita's testing reflects that the volumes of the filter media of the Brita LongLast Filter and the Brita LongLast+ Filter are both approximately 48 cm^3. (CX-0910C.0004 (volume testing); *see also* Tr. (Rockstraw) at 513:1-5; CDX-0008C.0115 (summarizing volume measurements).).

Respondents did not dispute this measurement. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the '141 patent.

b) "f = average filtration unit time over lifetime L (min/liter)"

Brita's testing data taken of the filtration unit time at 454 out of 455 filtered liters for the LongLast Filter and 453 out of 455 filtered liters for the LongLast+ Filter show that the average

time it takes to filter one liter of water over the lifetime of the Brita LongLast Products and LongLast+ Products are approximately 3.1 minutes/liter and 2.4 minutes/liter, respectively. (CX-0911C.0016-0018, 0023-0024, 0026, 0028-0033 (flow rate testing); *see also* Tr. (Rockstraw) at 513:6-9; CDX-0008C.0116 (summarizing filtration unit time data).). Dr. Rockstraw confirmed that the methodology Mr. Nishijima used for the DI Products was the same one he used for the Accused Products. (Tr. (Rockstraw) at 512:10-24.).

Again, Respondents did not contest these measurements. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the ’141 patent.

c) “c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter”

Brita’s testing of effluent lead concentration demonstrates that effluent lead concentration at the end of lifetime is approximately 0.04 µg/L and 0.1 µg/L for the Brita LongLast Products and the Brita LongLast+ Products, respectively. (CX-0912C.0003 (“# 11-Longlast, eff, 100%, 1-27-2022” and “# 12-Longlast Plus, eff, 100%, 1-27-2022” samples having lead concentrations of 0.043 ppb and 0.095 ppb, respectively, at 100% lifetime); CBr., App. A at 3; *see also* Tr. (Rockstraw) at 513:10-12; CDX-0008C.1117.).

Respondents did not contest these measurements. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this claim limitation/ issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that

the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the ’141 patent.

d) “L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)”

Brita provided persuasive documentary and testimonial evidence that was uncontested that the Brita LongLast and LongLast+ Filters have a validated lifetime of 120 gallons. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); CX-0020.0007 (same); Tr. (Rockstraw) at 513:13-16; Tr. (Kahn) at 287:23-25; CDX-0008C.0118 (summarizing evidence of the 120 gallon lifetime).). The packaging for the DI Products reflects that the DI Products are NSF/ANSI 53 certified to remove lead at pH 8.5 for 120 gallons and are therefore validated for that capacity. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); CX-0020.0007 (same); Tr. (Rockstraw) at 513:13-514:1.). Brita’s NSF/ANSI 53 certification indicates that the filters reduce lead below 5 ppb for 200% of filter lifetime, which is well below the 10 ppb threshold required to be certified for lead reduction under the NSF/ANSI 53 (2007) standard. (Tr. (Herman) at 1174:15-1175:9; CX-0690C (Franks Dep. Tr.) at 52:17-21 (effluent lead concentration threshold under the current NSF/ANSI 53 standard is 5 ppb).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice this limitation of claim 1 of the ’141 patent.

C. The DI Products Practice Claims 2-6 and 23 of the ’141 Patent

1. Claim 2: “The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200.”

As discussed above in Section XI(B) with respect to claim 1, the Brita LongLast and LongLast+ Filters achieve a FRAP factor of approximately 0.02 and 0.05, respectively. (Tr. (Rockstraw) at 514:10-16; CDX-0008C.0121 (calculating FRAP values for DI Products).).

Like claim 1, Respondents did not dispute these measurements. (*See* RPBr. at 42; RRBr.

at 19.). Thus, any argument Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice the additional limitation of claim 2 of the ’141 patent.

2. Claim 3: “The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3.”

Claim 4: “The water filter as recited in claim 3, wherein the volume of the filter media (V) is less than about 150 cm^3.”

As discussed above in Section XI(B)(3)(a), with respect to claim 1, the volumes of the filter media for the Brita LongLast and LongLast+ Filters are both approximately 48 cm^3. (CX-0910C.0004 (volume testing); *see also* Tr. (Rockstraw) at 514:17-24; CDX-0008C.0122.). Again, similar to claim 1, Respondents did not contest this measurement. (*See* RPBr. at 42; RRBr. at 19.). Accordingly, any argument Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice the additional limitations of claims 3 and 4 of the ’141 patent.

3. Claim 5: “The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 12 minutes per liter.”

Claim 6: “The water filter as recited in claim 5, wherein the average filtration unit time (f) is less than about 6 minutes per liter.”

As discussed above in Section XI(B)(3)(b) with respect to claim 1, the average filtration unit time over filter lifetime is approximately 3.1 minutes/liter for the Brita LongLast Filters and approximately 2.4 minutes/liter for the Brita LongLast+ Filters. (CX-0911C.0016-18, 0023-0024, 0026, 0028-33 (flow rate testing); *see also* Tr. (Rockstraw) at 515:1-9; CDX-0008C.0123

(summarizing flow rate data).). Again, Respondents did not dispute these measurements. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Filters practice the additional limitations of claims 5 and 6 of the ’141 patent.

4. Claim 23

Claim 23 of the ’141 patent is directed to a "gravity flow ***system*** for filtering water." (JX-0022 at cl. 1 (emphasis added).). Brita presented uncontested documentary and testimonial evidence that the Brita LongLast and LongLast+ Products include compatible containers[55] sold with respective LongLast and LongLast+ Filters. (CX-0020.0001, 0002, 0009 (LongLast+ Instructions); CX-0902C.0004 ¶ 8 (specifying the "LongLast and LongLast+ filters are sold individually, in multipacks, or in connection with the sale of a compatible pitcher or dispenser"); CX-0177C (summary listing of shipments in consumer units, including any unit, filter or container, that contains a Brita LongLast or LongLast+ Filter); Tr. (Rockstraw) at 515:14-15; Tr. (Joel Ramirez)[56] at 623:18-624:6.).

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[55] Compatible Brita containers include at least the Brita Amalfi, Atlantis, Bella, Champlain, Classic, Deluxe, Everyday, Grand, Huron, Lake, Legacy, LongLast, Marina, Mini Plus, Monterey, Pacifica, Metro, Mist, Riviera, Slim, Soho, Space Saver, Stainless Steel, Wave, Tahoe, and Ultramax pitchers and dispensers. (CBr. at 64 n.9 (citing Complainant Brita LP's Disclosure of Domestic Industry Products (Doc. ID 765219); CX-0012C (LongLast Packaging indicating that the LongLast Filter fits in all Brita pitchers except for the Stream and Infinity pitchers); CX-0013C (LongLast+ Packaging, indicating that the LongLast+ Filter fits in all Brita containers except for the Stream container); CX-0902C.0005 ¶ 11 (identifying compatible Brita containers)).).

[56] At the time of his testimony during the Hearing on August 19, 2022, Mr. Joel Ramirez was the Associate Director of Corporate Financial Planning and Analysis at the Clorox Company. (Tr. (Ramirez)

For the following reasons, the Brita LongLast and LongLast+ Products meet each limitation of claim 23.

a) "[a] gravity-flow system for filtering water"

Brita provided unrefuted testimonial and documentary evidence that Brita containers sold with LongLast and LongLast+ filters constitute "[a] gravity flow system for filtering water." (Tr. (Rockstraw) at 515:10-516:1; CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); *see also* CX-0020.0002 (LongLast+ instructions); CDX-0008C.0124 (identifying cartridge and both reservoirs on DI Products).).

Respondents did not dispute this. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this claim/issue is abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Products meet the preamble of claim 23 of the '141 patent.

b) "a container having a source water reservoir that can hold source water and a filtered water reservoir that can hold filtered water"

Brita presented documentary and testimonial evidence that the Brita LongLast and LongLast+ Products each include a container that has an upper source water reservoir that holds unfiltered source water. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); *see also* CX-0020.0001-02, 0009 (photograph of LongLast+ Product); CDX-0008C.0124 (identifying reservoirs); Tr. (Rockstraw) at 515:10-516:1.). The evidence also demonstrates that the same identified products have a lower water reservoir that holds the filtered water. (*Id.*).

at 619:14-17.). Brita identified Mr. Ramirez as a fact witness to testify about "evidence of Brita's industry in the United States." (CPSt. at 2.).

Respondents did not contest this. (*See* RPBr. at 42; RRBr. at 19.). Thus, any argument Respondents may try to make on this claim limitation/ issue has been abandoned, withdrawn, and/or waived argument on this claim/issue under Ground Rules 7.2 and 10.1.

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Products practice this limitation of claim 23 of the '141 patent.

c) "a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir"

The unrefuted documentary evidence Brita presented indicates that the Brita LongLast and LongLast+ Products include "a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir." (Tr. (Rockstraw) at 515:10-516:1; CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); *see also* CX-0020.0002 (LongLast+ instructions); CDX-0008C.0124 (showing cartridge in communication with both reservoirs).).

The same evidence also shows that this cartridge fits in all compatible Brita containers and has a path that allows water to flow from the source water reservoir to the filtered water reservoir. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging).).

Because Respondents did not contest this, any argument that Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1. (*See* RPBr. at 42; RRBr. at 19.).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Products practice this limitation of claim 23 of the '141

patent.

d) "a filter as recited in claim 1 disposed within the cartridge"

Brita provided uncontested documentary and testimonial evidence that the Brita LongLast and LongLast+ Products have "a filter as recited in claim 1 disposed within the cartridge" as recited in claim 23 of the '141 patent. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging); *see also* CX-0020.0002 (LongLast+ instructions); CX-0021.0003 (LongLast Filter photograph); CDX-0008C.124 (identifying claimed filter); Tr. (Rockstraw) at 515:10-516:1.). As discussed above in Section XI(B) with respect to claim 1, the Brita LongLast and LongLast+ Filters include a filter media that is disposed within the cartridge. (CX-0012C (LongLast packaging); CX-0013C (LongLast+ packaging).).

Because Respondents did not contest this evidence, any argument Respondents may try to make on this claim limitation/issue has been abandoned, withdrawn, and/or waived under Ground Rules 7.2 and 10.1. (*See* RPBr. at 42; RRBr. at 19.).

For the reasons discussed above, Brita has proven by a preponderance of evidence that the Brita LongLast and LongLast+ Products practice this limitation of claim 23 of the '141 patent.

XII. INVALIDITY

A. Priority Date of the '141 Patent

Brita claimed several patent priority dates ranging from 2006-2008 in its notice, "Brita LP's Notice of Patent Priority Dates/Dates of Conception" ("Notice of Priority Dates"), which Brita filed on March 1, 2022. (Doc. ID No. 764240 (Notice of Priority Dates) (Mar. 1, 2022).). Brita claimed a date of conception of the invention that became the '141 patent by at least May 16, 2006, and that it diligently reduced the invention to practice at least before September 20,

2006, the filing date of U.S. Provisional Application No. 60/846,162 ("the '162 application"). (*Id*. at 1.). Brita also alternatively claimed that the '141 patent has:

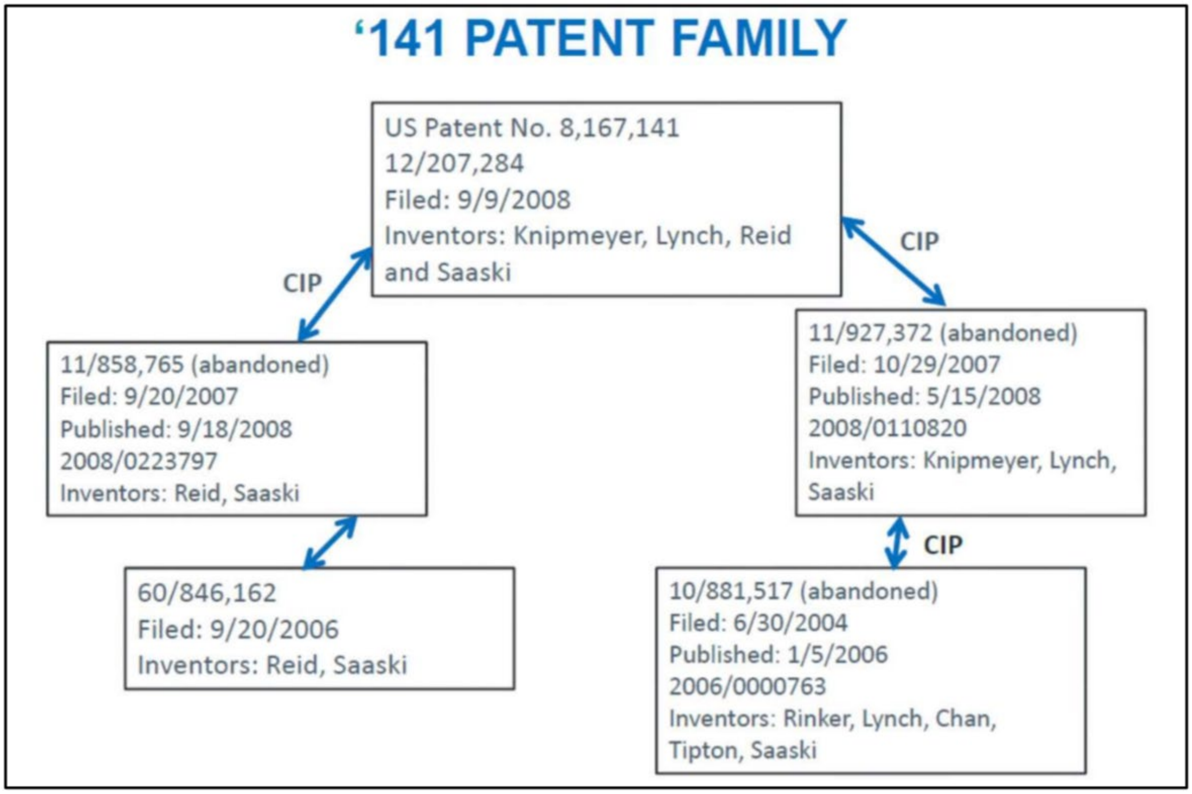
- priority to September 20, 2007, the filing date of U.S. Application No. 11/858,765, of which the '141 patent is a Continuation-In-Part ("CIP")[57];
- priority to October 29, 2007, the filing date of U.S. Application No. 11/927,372 ("the '372 application"), of which the '141 patent is also a CIP; or
- priority to September 9, 2008, the filing date of U.S. Application No. 12/207,284, which issued as the '141 patent. (*Id*. at 1-2.).

The filing dates of various priority documents that Brita claims also constitute the necessary and supported documentation for the priority dates of the '141 patent, are depicted in the Figure No. 11 below.[58]

[57] A continuation-in-part contains disclosure of an earlier application, but also includes added matter that is not present in that earlier application. *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1304 n.3 (Fed. Cir. 2008) ("*PowerOasis*") (citations omitted).

[58] Respondents alleged that there was improper inventorship of the '141 patent. (RPBr. at 142-43 (alleging Toni Lynch was not an inventor).). However, Respondents withdrew this issue. (*See* Outline of Issues, Doc. ID No. 783521 (Nov. 1, 2022).). Thus, Respondents have waived any argument on this issue under Ground Rule 10.1.

Figure No. 11: The '141 Patent Family's Application Filing Dates



(RPBr. at 45.).

Abandoned applications do not break the chain of priority so long as the written description in an earlier application discloses the invention in a later application sufficiently to satisfy the requirements of Section 112. 35 U.S.C. § 120 (benefit of earlier filing date); *In re NTP, Inc.*, 654 F.3d 1268, 1277 (Fed. Cir. 2011).

In its Pre-Hearing Brief, Brita withdrew its reliance upon the September 20, 2007 and September 9, 2008 priority dates. (CPBr. at 47.). Instead, during the Hearing and in its Post-Hearing Brief, Brita relied upon May 16, 2006 as the date of conception and argued the invention was diligently reduced to practice through July 2006 for purposes of prior art under 35 U.S.C. § 102(a) (Pre-AIA). (*Id.*; CBr. at 67.). Brita relied upon October 29, 2007, the filing date of the '372 application for purposes of prior art under 35 U.S.C. § 102(b) (Pre-AIA). (CPBr. at 47;

CBr. at 72-73). For the reasons discussed below, Brita has not proved conception of the ’141 patent on May 16, 2006. The earliest priority date of the ’141 patent is July 25, 2006, as evidenced by actual reduction to practice of the ’141 patent claims. The ’141 patent also is entitled to a priority date of September 19, 2006, which is the date of a memorandum that Dr. Knipmeyer created expressly articulating the FRAP factor. Additionally, the ’141 patent is entitled to priority to October 29, 2007, which is the filing date of the ’372 application.

1. Conception of the ’141 Patent

Brita relied upon May 16, 2006 as the date of conception followed by diligent reduction to practice of the invention for purposes of prior art under 35 U.S.C. § 102(a) (Pre-AIA). (CPBr. at 47; CBr. at 67.).

Conception is the “‘formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice.’” *Dawson v. Dawson*, 710 F.3d 1347, 1352 (Fed. Cir. 2013) (citations omitted). The Federal Circuit explained that “we have held that ‘conception is complete only when the idea is so clearly defined in the inventor’s mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation,’ and that ‘[a]n idea is definite and permanent when the inventor has a specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan he hopes to pursue.’” *Id*. (citations omitted).

In *Teva Pharm. Indus. Ltd. v. AstraZeneca Pharms. LP*, 661 F.3d 1378, 1384 (Fed. Cir. 2011) (“*Teva*”), the Federal Circuit explained that “Conception . . . requires both (1) the idea of the invention’s structure and (2) possession of an operative method of making it. . . . [This] require[s] more than an unrecognized accidental creation.” *Id.* (quoting *Invitrogen Corp. v.*

Clontech Labs., Inc., 429 F.3d 1052, 1063 (Fed.Cir.2005)). The inventor must "appreciate that which he has invented." *Teva*, 661 F.3d at 1384 (quoting *Invitrogen*, 429 F.3d at 1063). Yet the inventor need not use "the same words as the patentee would use to later use claim it." *Teva*, 661 F.3d at 1384.

Conception is the mental part of invention. *Burroughs Wellcome Co. v. Barr Labs., Inc.,* 40 F.3d 1223, 1228-29 (Fed.Cir.1994) ("*Burroughs*"). Because conception is a mental act, conception requires corroborating evidence, preferably by showing a contemporaneous disclosure. *Id.* at 1228. Conception requires a specific and settled idea, as opposed to a general goal or research plan. *Id*. Conception requires the inventor to describe the invention with particularity. *Id*. After conception, there must be diligence in reduction to practice of the invention. *Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1331 (Fed. Cir. 2019).

a) Background

Dr. Elizabeth Louise Knipmeyer[59] testified and explained during the Hearing that the problem she was trying to overcome with what became the '141 patent was lead removal from drinking water by filtration. (Tr. (Knipmeyer 155:1-23.). Dr. Knipmeyer, her birth surname being Elizabeth Chambers as reflected in documents, began working for Brita in 2006 after graduate school. Upon joining Brita, Dr. Knipmeyer learned about a change in protocol in the water filter industry that was focusing on lead removal from municipal water. (*Id*. at 163:1-15, 180:8-9.). Brita was facing a challenge in meeting a change in the NSF/ANSI 53 standard, and needed to change their water filter product to meet the new industry standard, or Brita faced

[59] Elizabeth Louise Knipmeyer is a fact witness for Brita and a named inventor of the '141 patent. (CPSt. at 2; JX-0022 at (75).). She holds Bachelor of Science and PhD degrees in chemical engineering. (Tr. (Knipmeyer) at 153:19-22.). Dr. Knipmeyer is Associate Director of Research and Development in the Brita division of the Clorox Company. (*Id*. at 153:13-154:2.). Based on her education and experience, Dr. Knipmeyer is qualified as an expert under FRE 703.

losing the lead claim on their product. (*Id*. at 165:9-16.). Dr. Knipmeyer worked to meet the new lead challenge in the NSF/ANSI 53 standard on a discovery project in Research and Development, first named "Carbonado," which was later named "G-Force" as the product was commercialized to bring it to market. (*Id*. at 172:3-14.). While working on project Carbonado, Dr. Knipmeyer worked with a team including Toni Lynch at Brita, and Roger Reid and Bruce Saaski, both of whom worked at a company named Omnipure. (*Id*. at 173:2-174:3.). Toni Lynch, Roger Reid and Bruce Saaski are also named inventors on the '141 patent. (JX-0022 at (75).).

In an effort to create a work methodology for her Brita team, Dr. Knipmeyer created a document, "May 16, 2006 Internal Document," which identified "the idea of which characteristics were important for us to pay attention to be able to actually go create physical prototypes for." (*Id*. at 176:12-17; CPX-12, also labelled exhibit CPX-0932 (PDF version) ("May 16, 2006 Internal Document"); *see also* Tr. (Knipmeyer) at 177:4-6).).

Dr. Knipmeyer testified that after preparing the May 16, 2006 Internal Document, her team set to work "trying to bring that [May 16, 2006 Internal Document] to life, creating physical prototypes that we could test, and understand if they were meeting what we wanted them to do." (*Id*. at 177:23-178:3.).

b) Key Dates to Prove Conception and Reduction to Practice

The dates and key events that Brita used to prove conception and reduction to practice of the invention are depicted in the Figure No. 12 timeline below.

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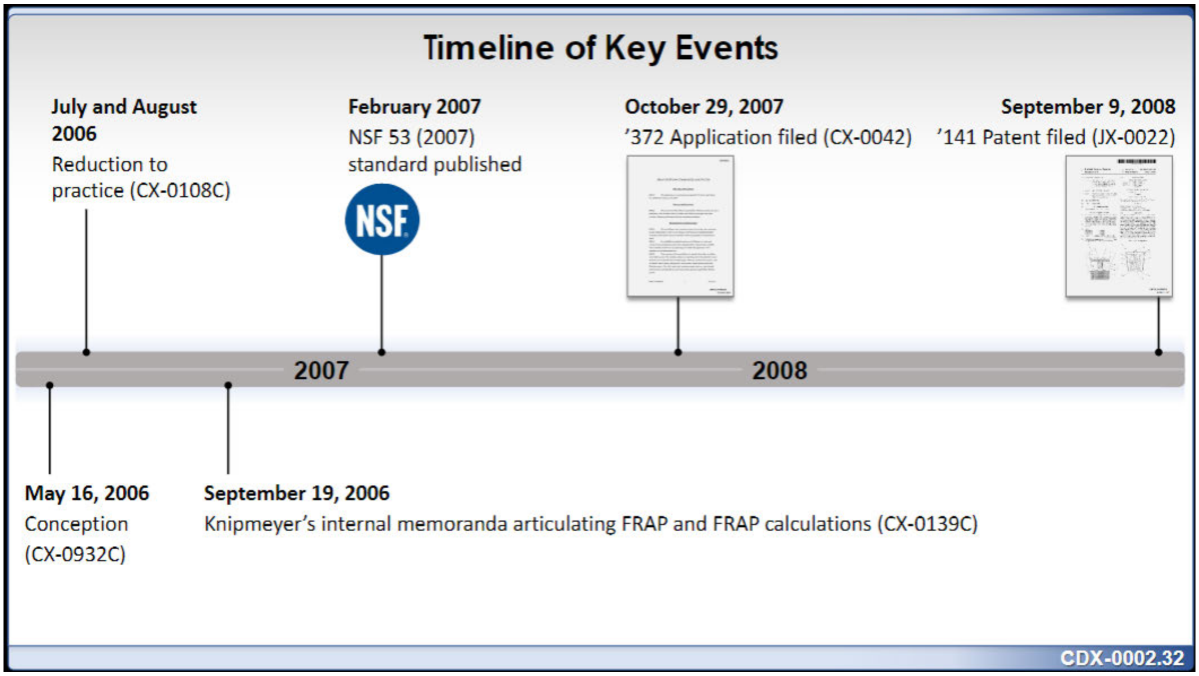
Figure No. 12: Timeline Depicting Events Brita Relies Upon to Establish Conception and Reduction to Practice of the ’141 Patent



(CDX-0002.0032 (demonstrative slide presented during Dr. Freeman’s testimony referencing CX-0932C (“Internal Document”), CX-0108C (Dr. Knipmeyer’s laboratory notebook), NSF 53 (2007) Standard (CX-0011), CX-0042 (’372 application) and JX-0022 (’141 patent)).).

The exhibits included in Figure No. 12 show the relative time sequence of exhibit CX-0932C, the May 16, 2006 Internal Document, which Brita relied upon to prove conception. Brita relies upon two (2) other documents, i.e., CX-0108C (Dr. Knipmeyer’s laboratory notebook) and CX-0139C (“Memorandum”), for reduction to practice. The timeline in Figure No. 12 above also shows the publishing of the NSF 53 (2007) standard, the filing of the ’372 application, and the filing of the ’141 patent. As discussed more fully below, exhibits CX-0932C (“May 16, 2006 Internal Document”), CX-0108C (Dr. Knipmeyer’s laboratory notebook), and CX-0139C (Memorandum) are critical evidence that Brita relied upon for its argument that it is entitled to a priority date of May 16, 2006. However, as discussed below, Brita’s argument and evidence fell short for at least the May 16, 2006 date.

c) Dr. Knipmeyer's Laboratory Notebooks

The exhibit marked CX-0108C is one of Dr. Knipmeyer's laboratory notebooks, "Notebook No. 8782." (CX-0108C.0003.). During the Hearing, Dr. Knipmeyer described that for the testing protocol that her team used, laboratory notebooks were issued to all scientists and personnel working in the laboratory to record everything that they were observed. (Tr. (Knipmeyer) at 167:11-19.). Each scientist signed and dated each page he/she worked on, and each page was then witnessed by another scientist who also signed and dated the page. (Tr. (Knipmeyer) at 167:11-19.). A review of exhibit CX-0108C shows that Dr. Knipmeyer recorded daily or every several days the results of testing from May 9, 2006 through December 15, 2006. (CX-0108C.0006, 0197.). The laboratory notebooks show that Dr. Knipmeyer kept meticulous notes that reflected careful testing and adherence to protocol. An example page from her laboratory notebook is shown in Figure No. 13 below.

Figure No. 13: Sample Page from Dr. Knipmeyer's Laboratory Notebook

(CX-0108C.0045 (page 40 of Dr. Knipmeyer's Laboratory Notebook No. 8782).).

d) May 16, 2006 Internal Document – CX-0932C

On May 16, 2006, Dr. Knipmeyer prepared an internal memorandum, CX-0932C ("May 16, 2006 Internal Document"), as part of her research in which she describes "the important characteristics of the filter we were trying to create and the tradeoff in relationship between those characteristics." (Tr. (Knipmeyer) at 177:8-13; *see* Figure No. 16, *infra* (CX-0932C).).

Dr. Knipmeyer explained that in the May 16, 2006 Internal Document, she attempted to describe the important characteristics and the tradeoff in relationship between those

characteristics. (Tr. (Knipmeyer) at 177:10-13.). These characteristics would become the variables and formulas of the FRAP factor, and represented "the start of the idea." (Tr. (Knipmeyer) at 177:10-13, CX-0932C.). Dr. Knipmeyer explained that she used the May 16, 2006 Internal Document to get "the team on the same page of the problem we were trying to solve, and then also identifying the idea of which characteristics were important for us to pay attention to be able to actually go create physical prototypes for." (Tr. (Knipmeyer) at 176:12-17.). The team then went about testing prototype water filters. (*Id*. at 177:23-178:3.).

Dr. Freeman, Brita's expert witness on conception and reduction to practice, corroborated Dr. Knipmeyer's testimony when he testified that a skilled artisan in 2006-2007 would have understood from the May 16, 2006 Internal Document that "they're [i.e., the inventors] trying to develop a detailed and perhaps predictive relationship between these variables" and that "the inventors understood the characteristics of the filters that they were going to make and how those impacted the properties and performance of the filters." (Tr. (Freeman) 1536:17-25.).

The May 16, 2006 Internal Document does not identify the FRAP formula as it appears in the '141 patent. However, while the Internal Document did not use all the same words as appeared in the '141 patent, this is not required for conception. Conception requires corroborating evidence, but does not require that the evidence use the same words as the patentee would use to later claim it. *Teva*, 661 F.3d at 1384.

The May 16, 2006 Internal Document that Dr. Knipmeyer created discloses the following terms as she was designing and conceiving of the elements of the '141 patent: "block characteristics" of "thickness," "parity flow rate," "NSF 53 Health Claims," "Pb Sorbent," "activated carbon," "Filter Life," and states "Develop a relationship between block thickness . . . insoluble Pb removal and flow rate"" (CX-0932C.). An image of this document is reproduced

below in Figure No. 14.

Figure No. 14: May 16, 2006 Internal Document Created by Dr. Knipmeyer

[redacted]

(CX-0932C (May 16, 2006 Internal Document).).

The phrases or terms written in the May 16, 2006 Internal Document relate to what eventually is coined the "FRAP Factor" in the '141 patent. In his view of Dr. Knipmeyer's work

in the Internal Document, Dr. Freeman explained that a skilled artisan would understand that the Internal Document showed variables that could be manipulated to influence insoluble lead removal. (Tr. (Freeman) at 1532:24-1533:1.).

Commenting on the May 16, 2006 Internal Document and what it disclosed, Dr. Freeman offered his opinion that the inventors "understood what they needed to do to and how they were going to go about doing it to achieve the invented filters." (Tr. (Freeman) at 1535:25-1536:2.). In other words, according to Dr. Freeman, Dr. Knipmeyer's listing of variables, as she explained them in the Internal Document, constituted a concrete idea of what would be involved in a viable filter FRAP Factor and, therefore, "conception" of the idea of the '141 patent.

e) The May 16, 2006 Internal Document Does Not Support Conception

However, the May 16, 2006 Internal Document and corroborating testimony by Dr. Knipmeyer do not support conception of the invention on May 16, 2006. The May 16, 2006 Internal Document does not include all the variables that are contained in the final FRAP factor. The "relationship" that the document states it is developing is a "relationship between block thickness, density (carbon granule size, binder:carbon ratio), insoluble Pb removal and flow rate." (CX-0932C.). However, the FRAP factor does not include density, carbon granule size, binder:carbon ratio, and has an inverse flow rate. While thickness is related to volume, and flow rate may encompass an inverse flow rate, the FRAP factor variables, **V**, **f**, $\mathbf{c_e}$, **L**, are not all present in the relationship that is proposed in the May 16, 2006 Internal Document.

Moreover, Dr. Knipmeyer explained that ***in trying to get the research team to work together***, she created a document, "May 16, 2006 Internal Document," which identified "the idea of which characteristics were important for us to pay attention to to be able ***to actually go create*** physical prototypes for." (Tr. (Knipmeyer) at 176:12-17 (emphasis added).). There is no

evidence that prototypes were available that met the FRAP factor required by asserted claim 1 in the Internal Document. Rather, Dr. Knipmeyer and her team were going to—in the future—test prototypes. (*Id.*)

As Respondents argued, convincingly, the May 16, 2006 Internal Document is more appropriately a plan for future research and areas to focus on, which is not a "definite, settled idea" but rather is a "general goal or research plan he [or she] hopes to pursue" that does not suffice for conception. (RSRBr. at 2 (quoting *Burroughs*, 40 F.3d at 1229).).

In *Burroughs*, the Federal Circuit explained that the test for conception is "whether the idea was definite and permanent enough that one skilled in the art could understand the invention." *Burroughs*, 40 F.3d at 1228; *Dawson*, 710 F.3d at 1352. Conception requires a specific and settled idea, as opposed to a general goal or research plan. *Burroughs*, 40 F.3d at 1228. Conception requires the inventor to describe the invention with particularity. *Id*.

As explained above, the May 16, 2006 Internal Document need not use the same language as in the '141 patent. However, the May 16, 2006 Internal Document by itself presented variables that are not present in the FRAP factor and also lacks recognition of some variables that are in the FRAP equation. Conception of a "specific, settled idea" as explained by the Federal Circuit in *Teva* is not embodied by the list of variables presented in the May 16, 2006 Internal Document. Nor has evidence been presented to show that prototypes of water filters that achieved the FRAP factor were available as of May 16, 2006. They simply were not yet available.

Therefore, while Dr. Knipmeyer was a credible witness, the May 16, 2006 Internal Document and her supporting testimony fail to provide support for conception of the '141 patent as of May 16, 2006. Dr. Freeman's testimony is not sufficient to overcome the deficiencies in

the asserted conception date evidence.

Accordingly, the ’141 patent is not entitled to a conception date of May 16, 2006.

2. Reduction to Practice of the Invention

Dr. Knipmeyer and her team at Brita worked to reduce to practice the invention throughout the summer of 2006. Reduction to practice of an invention requires that an embodiment of the claimed invention has (1) been constructed and (2) works for its intended purpose. *Teva*, 661 F.3d at 1383 (citing *Mycogen Plant Sci.,* 243 F.3d 1316, 1332 (Fed. Cir. 2001)). There must be diligence from conception to reduction to practice. *Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1331 (Fed. Cir. 2019). Diligence requires corroboration that can be shown by inventor testimony and notebook records. *Brown v. Barbacid*, 436 F.3d 1376, 1380 (Fed. Cir. 2006).

Dr. Knipmeyer testified that she and her team at Brita conducted experiments in the summer of 2006 that were recorded in Dr. Knipmeyer’s laboratory notebooks. (Tr. (Knipmeyer) at 179:25-181:3.). Dr. Knipmeyer and her team tested about a hundred prototypes. (Tr. (Knipmeyer) at 189:5-8.). Dr. Knipmeyer explained that page 73 of her laboratory notebook, dated June 7, 2006, shows a picture she drew of a pantaloon/G-Force water filter that was tested. (Tr. (Knipmeyer) at 179:23-180:16; CX-0108C.0078). Page 91 of her laboratory notebook, which is dated June 17, 2006, shows a drawing of another filter that was tested, a prototype Maxtra filter. (Tr. (Knipmeyer) at 180:24-181:3; CX-018C.0096.).

a) FA 3-2 Water Filter

Dr. Knipmeyer testified about the testing of “Maxtra-shaped blocks” of an FA 3-2 filter to a recorded result of a 200% lifetime. (Tr. (Knipmeyer) at 183:12-17, 184:2-13.). The FA 3-2 water filter had a volume of 105 cm^3, contained activated carbon fiber and Alusil lead sorbent,

and used a particulate lead challenge water that was the NSF/ANS7I 53 draft challenge lead. (*Id*.). Dr. Knipmeyer explained that her team was "starting to get some good performance against the particulate lead" using the FA 3-2 filter with "some" passing values of less than 10 parts per billion. (*Id*. at 184:25-185:1; CX-0108C.0100 (page 95 of laboratory notebook, recordation date of July 5, 2006).).

b) PA 3-8 Water Filter – A Working Prototype

Dr. Knipmeyer also explained the process she used for the testing of the PA3-8 filter. (Tr. (Knipmeyer) at 185:18-19; CX-0108C.0120.). Figure No. 15, below, shows page 115 of Dr. Knipmeyer's laboratory notebook with her recorded testing of filter PA 3-8. (CX-0108C.0120). Figure No. 15, page 115 of Dr. Knipmeyer's notebook, describes Formula PA-3 filters manufactured on July 25, 2006, and a notebook recordation date of August 16, 2006.

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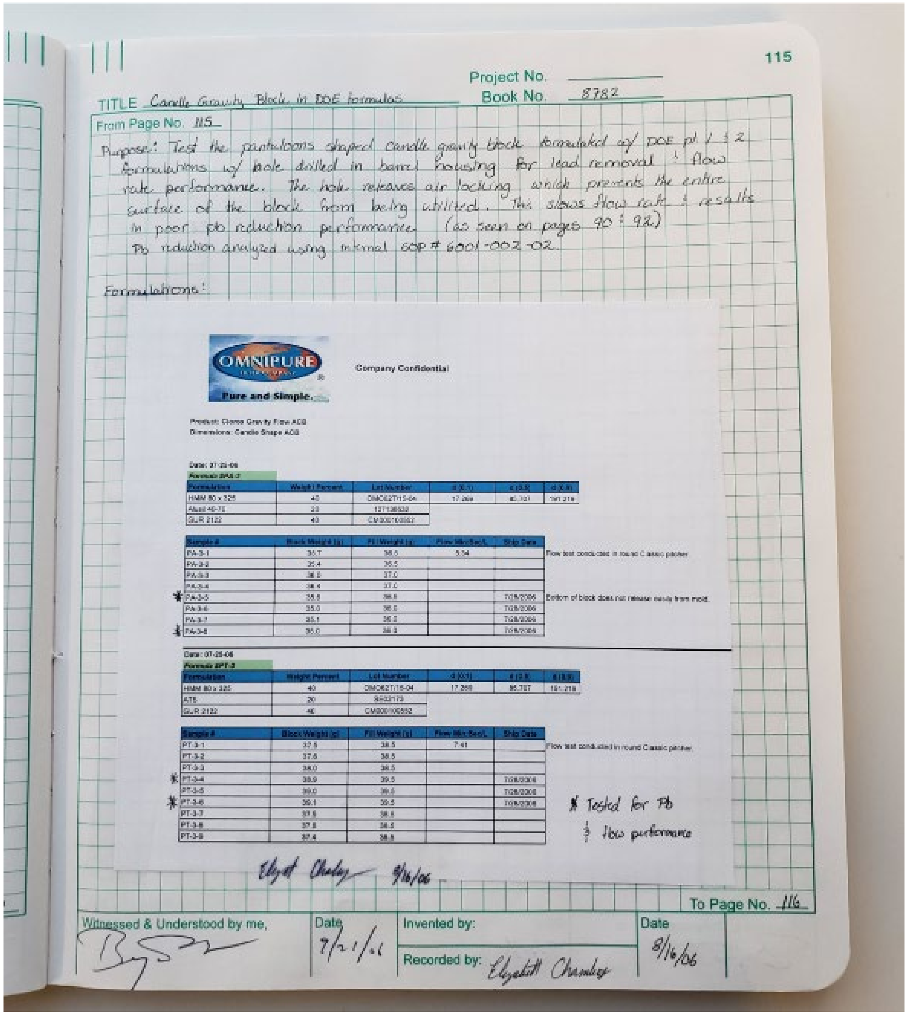
Figure No. 15: Excerpt of Dr. Knipmeyer's Laboratory Notebook Describing Formula PA-3 Water Filters



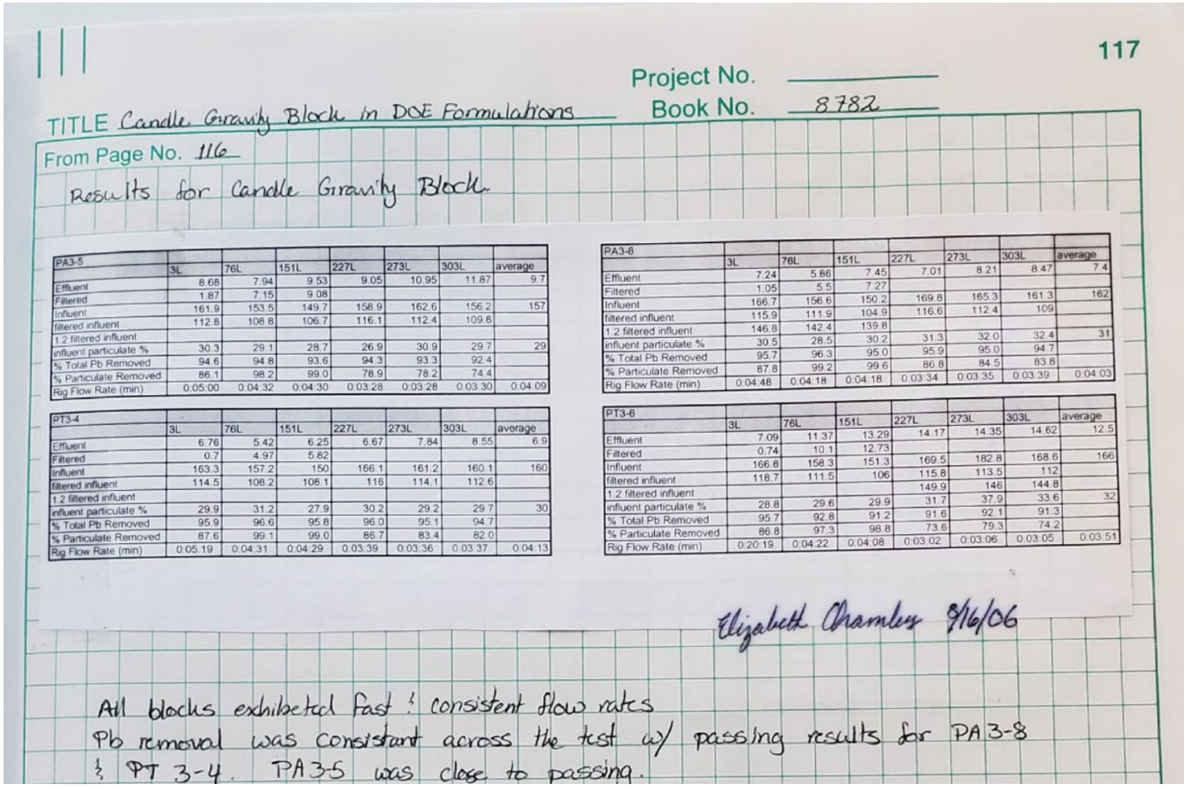
(CX-0108C.0120 (Page 115 from Dr. Knipmeyer's laboratory notebook) (excerpt showing description of filters including Formula PA-3 filters manufactured on July 25, 2006, notebook recordation date of August 16, 2006).).

Dr. Knipmeyer testified that the PA 3-8 was manufactured on July 25, 2006, and that this prototype had 40 percent carbon, 20 percent Alusil absorbent. (Tr. (Knipmeyer) at 185:13-22.). This July 25, 2006 date is significant because it is the date of a working prototype, as explained more fully below.

Dr. Knipmeyer explained the PA 3-8 was tested against the draft NSF/ANSI 53 standard.

(*Id*. at 185:23-25.). Dr. Knipmeyer recorded the results at laboratory notebook page 117, reproduced below in Figure No. 16. (CX-0108C.0122; Tr. (Knipmeyer) at 186:3-6.).

Figure No. 16: Excerpt of Dr. Knipmeyer's Laboratory Notebook with Lead Testing Results of Formula PA-3 Water Filters



117

Project No.

TITLE Candle Gravity Block in DOE Formulations Book No. 8782

From Page No. 116

Results for Candle Gravity Block

PA3-5	3L	76L	151L	227L	273L	303L	average
Effluent	8.68	7.94	9.53	9.05	10.95	11.87	9.7
Filtered	1.87	7.15	9.08				
Influent	161.9	153.5	149.7	158.9	162.6	156.2	157
filtered influent	112.8	108.8	106.7	116.1	112.4	109.8	
1.2 filtered influent							
influent particulate %	30.3	29.1	28.7	26.9	30.9	29.7	29
% Total Pb Removed	94.6	94.8	93.6	94.3	93.3	92.4	
% Particulate Removed	86.1	98.2	99.0	78.9	78.2	74.4	
Rig Flow Rate (min)	0:05:00	0:04:32	0:04:30	0:03:28	0:03:28	0:03:30	0:04:09

PA3-8	3L	76L	151L	227L	273L	303L	average
Effluent	7.24	5.86	7.45	7.01	8.21	8.47	7.4
Filtered	1.05	5.5	7.27				
Influent	166.7	156.6	150.2	169.8	165.3	161.3	162
filtered influent	115.9	111.9	104.9	116.6	112.4	109	
1.2 filtered influent	146.8	142.4	139.8				
influent particulate %	30.5	28.5	30.2	31.3	32.0	32.4	31
% Total Pb Removed	95.7	96.3	95.0	95.9	95.0	94.7	
% Particulate Removed	87.8	99.2	99.6	86.8	84.5	83.8	
Rig Flow Rate (min)	0:04:48	0:04:18	0:04:18	0:03:34	0:03:35	0:03:39	0:04:03

PT3-4	3L	76L	151L	227L	273L	303L	average
Effluent	6.76	5.42	6.25	6.67	7.84	8.55	6.9
Filtered	0.7	4.97	5.82				
Influent	163.3	157.2	150	166.1	161.2	160.1	160
filtered influent	114.5	108.2	108.1	116	114.1	112.6	
1.2 filtered influent							
influent particulate %	29.9	31.2	27.9	30.2	29.2	29.7	30
% Total Pb Removed	95.9	96.6	95.8	96.0	95.1	94.7	
% Particulate Removed	87.6	99.1	99.0	86.7	83.4	82.0	
Rig Flow Rate (min)	0:05:19	0:04:31	0:04:29	0:03:39	0:03:36	0:03:37	0:04:13

PT3-6	3L	76L	151L	227L	273L	303L	average
Effluent	7.09	11.37	13.29	14.17	14.35	14.62	12.5
Filtered	0.74	10.1	12.73				
Influent	166.8	158.3	151.3	169.5	182.8	168.6	166
filtered influent	118.7	111.5	106	115.8	113.5	112	
1.2 filtered influent				149.9	146	144.8	
influent particulate %	28.8	29.6	29.9	31.7	37.9	33.6	32
% Total Pb Removed	95.7	92.8	91.2	91.6	92.1	91.3	
% Particulate Removed	86.8	97.3	98.8	73.6	79.3	74.2	
Rig Flow Rate (min)	0:20:19	0:04:22	0:04:08	0:03:02	0:03:06	0:03:05	0:03:51

Elizabeth Chambers 8/16/06

All blocks exhibited fast & consistent flow rates
Pb removal was consistant across the test w/ passing results for PA3-8
& PT 3-4. PA3-5 was close to passing.

(CX-0108C.0122 (Excerpt from page 117 of Dr. Knipmeyer's laboratory notebook, notebook recordation date of August 16, 2006) (excerpt of lead testing results).).

Dr. Knipmeyer testified that she wrote down, below the recordation of the results of her testing of the PA 3-8, PT 3-4 prototypes, that the blocks had "fast and consistent flow rates" and "Pb removal was consistent across the test w/ passing results for PA3-8 & PT 3-4" and that she recognized that "we found a way to meet this emerging lead challenge, this particulate lead challenge." (Tr. (Knipmeyer) at 186:23-187:11.). Dr. Knipmeyer's recorded testing data show that the water filters she tested had been manufactured on of July 25, 2006, worked for their intended purpose, and she recognized the significance of the results.

Dr. Freeman, Brita's expert, testified that using Dr. Knipmeyer's data, he calculated a FRAP factor of 36.5 for the PA 3-8 filter. (Tr. (Freeman) at 1542:3-13.). Dr. Freeman offered his opinion that the PA3-8 was an actual reduction to practice of claims 1-6 of the '141 patent, and that he was not aware of any dispute of the actual reduction to practice. (*Id.* at 1542:12-24.).

Reduction to practice of an invention requires that an embodiment of the claimed invention has: (1) been constructed; and (2) works for its intended purpose. *Teva*, 661 F.3d at 1383. There was an actual reduction to practice on July 25, 2006 because: (1) a working prototype PA 3-8 had been constructed; and (2) it worked for its intended purpose, water filtration with sufficient lead removal that achieved the claimed FRAP factor value.

c) PA 2-2 Water Filter – Another Working Prototype

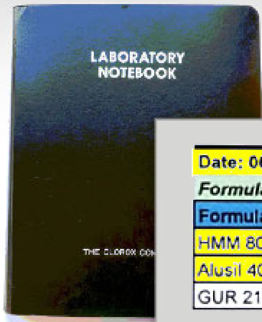
Dr. Freeman explained that the excerpts from her notebook dated August 1, 2006, shown in Figure No. 17, below, describes the PA 2-2 filter, also called the "Maxtra" filter that contained activated carbon (HMM 80 x 325) and lead scavenger (Alusil 40-70). (Tr. (Freeman) 1537:7-18, 1538:2-1539:13.).

Public Version

Figure No. 17: Excerpt of Dr. Knipmeyer's Laboratory Notebook Describing Filter PA2-2

Reduction to Practice: Filter PA 2-2

Activated carbon and a lead scavenger



Date: 06-28-06

Formula #PA-2

Formulation	Weight Percent	Lot Number	d (0.1)	d (0.5)	d (0.9)
HMM 80 x 325	45	OMO5CT/161.01	17.231	80.179	181.050
Alusil 40-70	15				
GUR 2122	40				

Sample #	Block Weight (g)	Fill Weight (g)	Rig Flow Min:Sec/L	Pb pass/fail
PA-2-1	43.3	44.0	9:53	Fail
PA-2-2	43.5	44.0		
PA-2-3	43.3	44.0	9:29	in test

CX-0108C.0110

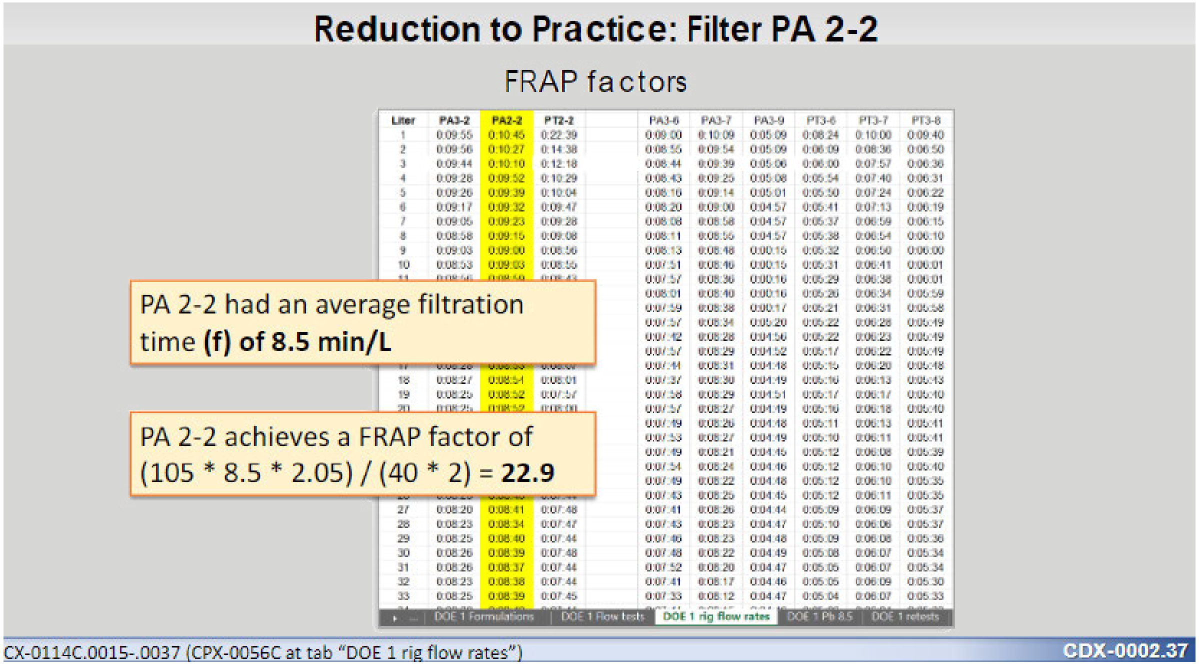
CDX-0002.34

(CDX-0002.0034 (excerpts of CX-0108.0110, page 105 of Dr. Knipmeyer's laboratory notebook, notebook recordation date of August 1, 2006).).

Dr. Freeman explained that consistent with the testing protocol suggested by NSF, that is described in Section IX, above, Dr. Knipmeyer measured the flow rate after each liter of water, Figure No. 18, below, from which an average filtration unit time for the FRAP formula could be calculated. (Tr. (Freeman) at 1538:7-13.).

Public Version

Figure No. 18: Excerpt of Dr. Knipmeyer's Recording Flow Rates at Each Liter

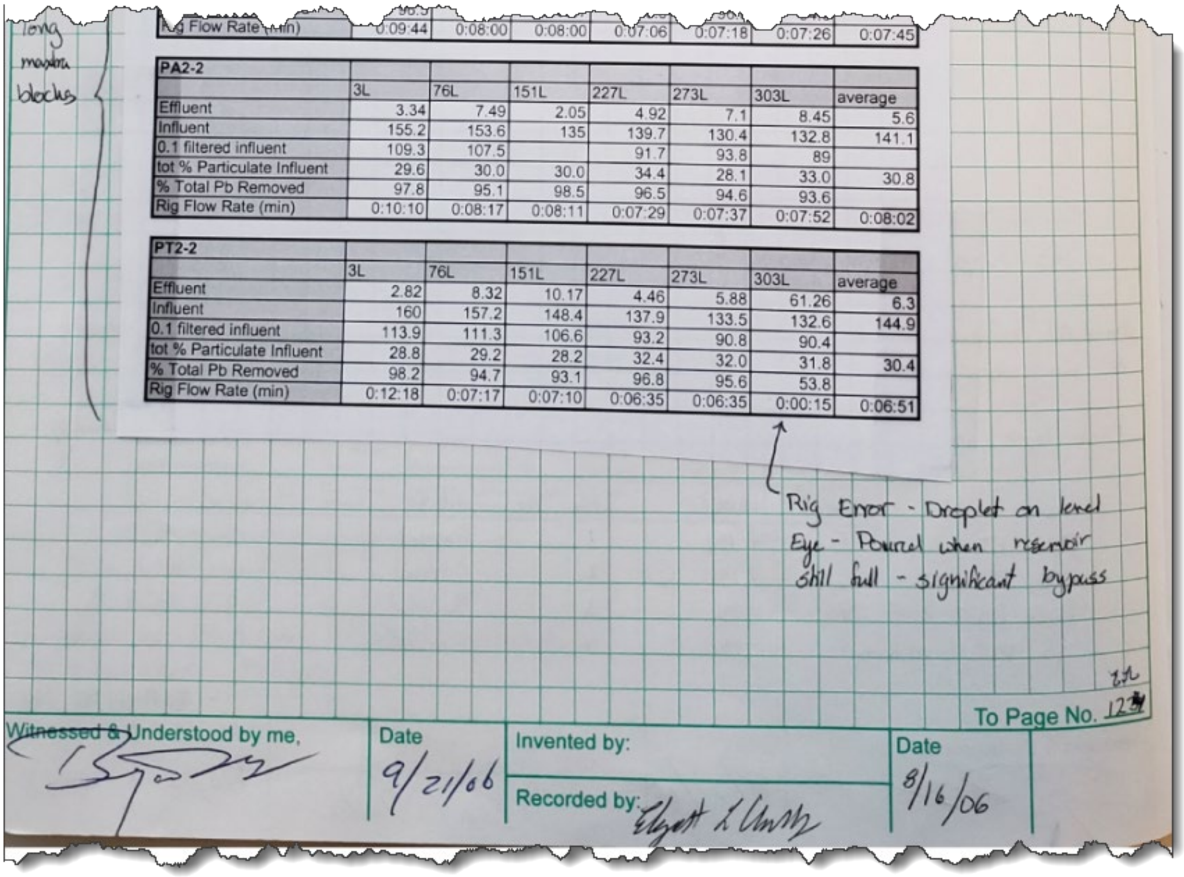


(CDX-0002.0037 (collecting data for PA 2-2 filter from CX-0114C.0015-37 (tabulations showing Dr. Knipmeyer's recordation of times to filter each liter of water) (no date available).).

Another excerpt, Figure No. 19, below, taken from Dr. Knipmeyer's laboratory notebook recorded on August 16, 2006, lists lead testing data of the filter PA 2-2. (CX-0108C.0129.). The PA 2-2 water filter had lead effluent levels of 2.05 parts per billion at 151 liters, and 8.45 parts per billion at 303 liters. (*Id.*). Dr. Freeman also corroborated the testing results through his testimony. (Tr. (Freeman) 1537:7-18, 1538:2-1539:13.).

Public Version

Figure No. 19: Excerpt of Dr. Knipmeyer's Laboratory Notebook Showing Lead Testing Results of PA2-2 Water Filter



long [illegible] blocks

Rig Flow Rate (min)	0:09:44	0:08:00	0:08:00	0:07:06	0:07:18	0:07:26	0:07:45

PA2-2							
	3L	76L	151L	227L	273L	303L	average
Effluent	3.34	7.49	2.05	4.92	7.1	8.45	5.6
Influent	155.2	153.6	135	139.7	130.4	132.8	141.1
0.1 filtered influent	109.3	107.5		91.7	93.8	89	
tot % Particulate Influent	29.6	30.0	30.0	34.4	28.1	33.0	30.8
% Total Pb Removed	97.8	95.1	98.5	96.5	94.6	93.6	
Rig Flow Rate (min)	0:10:10	0:08:17	0:08:11	0:07:29	0:07:37	0:07:52	0:08:02

PT2-2							
	3L	76L	151L	227L	273L	303L	average
Effluent	2.82	8.32	10.17	4.46	5.88	61.26	6.3
Influent	160	157.2	148.4	137.9	133.5	132.6	144.9
0.1 filtered influent	113.9	111.3	106.6	93.2	90.8	90.4	
tot % Particulate Influent	28.8	29.2	28.2	32.4	32.0	31.8	30.4
% Total Pb Removed	98.2	94.7	93.1	96.8	95.6	53.8	
Rig Flow Rate (min)	0:12:18	0:07:17	0:07:10	0:06:35	0:06:35	0:00:15	0:06:51

Rig Error - Droplet on level
Eye - Poured when reservoir
still full - significant bypass

To Page No. 12[illegible]

Witnessed & Understood by me, [illegible] | Date 9/21/06 | Invented by: | Recorded by: [illegible] | Date 8/16/06

(CX-0108C.0129 (excerpt from page 124 of Dr. Knipmeyer's laboratory notebook, including a line that records the lead effluent concentrations of PA2-2 water filter, notebook recordation date of August 16, 2006).).

Dr. Freeman calculated the FRAP formula for the PA 2-2 water filter, using data that Dr. Knipmeyer recorded, and obtained a FRAP value of 22.9. (Tr. (Freeman) at 1540:7-11.). This FRAP factor value also met the limitations of the FRAP formula of claim 1 of the '141 patent because it was less than 350. The laboratory notebook does not show a FRAP Factor value, but Dr. Freeman's testimony shows that the FRAP value was achieved, inherently, as shown by his calculations.

Respondents did not dispute the finding that the PA 3-8 and PA 2-2 water filters achieve

the cited FRAP value. (Tr. (Freeman) at 1542:12-19.). Respondents only argued against the conception date of May 16, 2006. (RSRBr. at 3.).

In summary, because Dr. Knipmeyer recorded in one of her laboratory notebooks that at least the PA 3-8 water filter and been constructed and worked for its intended purpose, and Dr. Freeman corroborated that Dr. Knipmeyer's test data showed that the FRAP factor had been satisfied, there was an actual reduction to practice of an embodiment of the claimed invention of the '141 patent at least by July 25, 2006, the date of manufacture of the PA 3-8 water filter.

While conception is not found as of May 16, 2006, in the event the May 16, 2006 date is deemed conception, there was diligence from the conception through actual reduction to practice on at least July 25, 2006 because Dr. Knipmeyer's recorded testing data in her laboratory notebook showed continuous testing from conception to actual reduction to practice from May 16, 2016 through August, 2006, i.e., throughout the summer of 2006, as corroborated by dated laboratory notebook entries from May through August 2006.

d) Articulation of the FRAP Factor

Dr. Knipmeyer continued testing of water filters, as corroborated by her dated laboratory notebook entries. She testified that she first started using the description "FRAP" sometime in the August-September 2006 time range. (Tr. (Knipmeyer) at 192:9-12.).

Dr. Knipmeyer also testified that she created a memorandum ("Memorandum") on September 19, 2006. (CX-0139C ("Memorandum"); Tr. (Knipmeyer) at 192:16-18, 193:4-10.). The Memorandum recited the FRAP formula and the charts that would eventually issue as Figures 21-23 in the '141 patent. (*Id*. at 192:15-195:15.). In the event that the PA 3-8 and PA 2-2 water filters are deemed to not sufficiently show actual reduction to practice of claims 1-6, the Memorandum, CX-0139C, that describes verbatim the FRAP Factor and variables present in the

asserted claims, in combination with Dr. Freeman's calculations that the PA 2-2 and PA 3-8 filters achieve the cited FRAP values, proves reduction to practice.

Accordingly, Dr. Knipmeyer's testimony combined with her summer of 2006 contemporaneous, corroborating laboratory notebooks that showed her testing of the FRAP variables and of filters that met her testing parameters, together with the September 19, 2006 Memorandum proves Brita's reduction to practice of the invention of the '141 patent. Dr. Knipmeyer's credible and reliable documentary and testamentary evidence is supported in Dr. Freeman's opinions with respect to the reduction to practice of the PA 3-8 and PA 2-2 water filters, and in the Memorandum.

Respondents have not clearly and convincingly proven that the '141 patent was not reduced to practice by July 25, 2006. It is a finding of both fact and law that Brita reduced to practice the invention of the '141 patent by July 25, 2006.

It is a legal and factual finding that the invention was not conceived on May 16, 2006. It was reduced to practice on July 25, 2006, under an inherency doctrine, and on September 19, 2006, when the FRAP factor was explicitly written in the Memorandum. The reduction to practice of the invention is corroborated by the credible evidence of Dr. Knipmeyer's meticulous laboratory notebooks and internal Memoranda, and the credible testimony Dr. Knipmeyer and Dr. Freeman.

3. Diligence from Actual Reduction to Practice to the Filing of the Patent Application

Following actual reduction to practice, the invention was the subject of a patent application, the '372 application, which was filed on October 29, 2007. Delay in making an invention publicly known, or failure to file a patent application within a reasonable time after first making the invention may constitute abandonment, suppression or concealment of the

invention. *Dow Chem. Co. v. Astro-Valcour, Inc.*, 267 F.3d 1334, 1342 (Fed. Cir. 2001).

Here, there was a delay from July 25, 2006 until October 29, 2007, with intervening activity, such as the articulation of the FRAP Factor in the Memorandum on September 19, 2006. Thus, a delay in filing of over a year is present between July 25, 2006 and October 29, 2007. A delay of slightly less than one year between actual reduction to practice and filing of an application was not found to be unreasonably long so as to infer suppression or concealment of the invention. *Hamlin & George*, 221 U.S.P.Q. 1006, *7 (June 6, 1983) (finding that the invention was not suppressed or concealed within the meaning of 35 U.S.C. § 102(g)(pre-AIA)).

Here, a delay of over a year is not unreasonably long to infer suppression or concealment of the invention. There is no evidence is of record to suggest that there was suppression or concealment. Accordingly, Brita may rely on its actual reduction to practice date of July 25, 2006. Because there was no argument with respect to suppression or concealment by the Parties, and no adducement of evidence of the same, this argument has been waived pursuant to Ground Rules 7.2 and 10.1.

4. The ’372 Application

The ’141 patent is entitled to priority back to the filing date of the ’372 application, which is October 29, 2007, because the ’141 patent has sufficient written description support in the ’372 application. The ’141 patent is a CIP of the ’372 application.

Patent law prior to enactment of the America Invents Act (“Pre-AIA”) applies here because all filing dates are prior to March 16, 2013. 35 U.S.C. § 100 (Note). The benefit of an earlier filing date is stated in 35 U.S.C. § 120:

> An application for patent for an invention ***disclosed in the manner provided by the first paragraph of section 112*** of this title ***in an application previously filed in the United States***, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application ***shall have the same***

> ***effect, as to such invention, as though filed on the date of the prior application***, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application. […]

35 U.S.C. § 120 (Pre-AIA) (emphases added).

In other words, so long as the requirements of 35 U.S.C. § 112, first paragraph, are met, the ’141 patent has priority to the parent application’s filing date, here, the filing date of the ’372 application. 35 U.S.C. § 112, first paragraph, is the written description requirement. “To satisfy the written description requirement the disclosure of the prior application must ‘convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession *of the invention*.’ *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008) (“*PowerOasis*”) (citing *Vas–Cath Inc. v. Mahurkar,* 935 F.2d 1555, 1563–64 (Fed.Cir.1991) (emphasis in original).).

For a patent that is a CIP of a prior application, subject matter described in the prior application that satisfies the written description requirement can entitle that patent to the benefit of the filing date of the prior application. *PowerOasis*, 522 F.3d at 1306-07 (explaining that there must be actual or inherent disclosure to comply with the written description requirement); *see also Nat. Alternatives Int’l, Inc. v. Iancu*, 904 F.3d 1375, 1379 (Fed. Cir. 2018) (“*Nat. Alternatives*”). Written description compliance is a question of fact. *PowerOasis*, 522 F.3d at 1307. Entitlement of a patent to priority of an earlier application under Section 120 is a legal determination based on underlying fact findings. *Nat. Alternatives*, 904 F.3d at 1379 (citing *In re Owens*, 710 F.3d 1362, 1366 (Fed. Cir. 2013)). “When the underlying facts are undisputed, priority date determination is purely a legal question.” *Nat. Alternatives*, 904 F.3d at 1379 (citing *Medtronic CoreValve v. Edwards Lifesciences Corp.*, 741 F.3d 1359, 1363 (Fed. Cir.

2014)).

"In CIP applications, priority is assessed on a claim-by-claim basis. An applicant can obtain an earlier effective filing date for claims in a CIP application only if those claims find support in an earlier-filed nonprovisional application." *Nat. Alternatives*, 904 F.3d at 1383 (Fed. Cir. 2018) (citing *Transco Prods., Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 557 n.6 (Fed. Cir. 1994).)

The burden of proof was addressed in *Certain Adjustable Keyboard Support Systems*. *Certain Adjustable Keyboard Support Systems*, Inv. No. 337-TA-670, Publ. No. 4285, Comm'n Op. at 79 (Nov. 1, 2011) ("*Adjustable Keyboard"*). In *Adjustable Keyboard*, when respondent introduced allegedly anticipating prior art, the ultimate burden remained with respondent to prove invalidity based on anticipating prior art, but complainant also needed to produce sufficient evidence and argument that the priority application relied upon had written description support for the asserted claims. *Adjustable Keyboard*, Comm'n Op. at 78-79 (citing *PowerOasis,* 522 F.3d at 1303, 1305 (explaining the burden of invalidity by clear and convincing evidence remains with the challenger); *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007) (advising patentee to introduce evidence sufficient to rebut the challenge of invalidity); *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008) (explaining that faced with alleged prior art, patentee may antedate the prior art by "producing sufficient evidence and argument to show that" the prior application "contains a written description to support the limitations" in the asserted claims, and then proponent of the invalidity defense must show that patentee "is not entitled to the benefit of the earlier filing date")).

Here the '141 patent is a CIP of the earlier-filed nonprovisional '372 application and is entitled to the '372 application's filing date under Section 120 for the following reasons.

Moreover, the PTO has already given a detailed decision in an *inter partes* review ("IPR") denial decision in which it has granted priority to the '372 application.

a) Written Description Support in the '372 Application

The written description requirement can be met through the inherency doctrine. *PowerOasis*, 522 F.3d at 1306-07. The Federal Circuit's *Kennecott Corp. v. Kyocera International, Inc.*, 835 F.2d 1419, 1420 (Fed. Cir. 1987) ("*Kennecott*") holding explains the inherency doctrine in the context of a CIP application that claims priority to a parent application. In *Kennecott*, the Federal Circuit held that the new description in a subsequent application of a microstructure did not deprive the subsequent CIP application of priority even though the microstructure was not described in a parent application. *Id.* at 1423. The microstructure was depicted in pictures in the prior application, and the same product with the same structure was present in both the CIP application and the parent application. *Id*. The Federal Circuit explained that "[u]nder the doctrine of inherent disclosure, when a specification describes an invention that has certain undisclosed yet inherent properties, that specification serves as adequate written description to support a subsequent patent application that explicitly recites the invention's inherent properties." *Id.*

Here, while the FRAP factor values were not explicitly calculated in the earlier-filed priority application, the '372 application provided adequate written description support through the doctrine of inherency. As explained more fully below, the '372 application describes gravity-fed water filters with activated carbon and lead scavenger and lists values for the variables of the FRAP factor using the same definitions and ranges as in the '141 patent. Dr. Freeman was able to calculate the FRAP factor using the values provided in the '372 application, and found that they met the FRAP factor limitation of the asserted claims.

Public Version

Dr. Freeman testified credibly based upon clear evidentiary support that the ’372 application provides written description support for the asserted claims of the ’141 patent. (Tr. (Freeman) at 1544:22-1554:14.).

b) The ’372 Application’s Disclosure of Water Filters with Carbon and Scavenger

Dr. Freeman testified that the ’372 application describes a gravity-fed carbon block water filter with activated carbon and lead scavenger where the specification has a “Summary of the Invention” at paragraph 17, as shown in Figure No. 20 below. (*Id.* at 1545:24-6).

Figure No. 20: Paragraph 17 from the ’372 application

SUMMARY OF THE INVENTION

[0017.] A gravity fed carbon block water filter according to one embodiment of the present invention includes activated carbon particles; a binder material interspersed with the activated carbon particles; and a lead scavenger coupled to at least one of the activated carbon particles and binder material, the lead scavenger being for removing lead from water, where a lead concentration in a final liter of effluent water filtered by the filter is less than about 10 μg/liter after about 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion total lead with 30-60 parts per billion thereof being colloidal lead greater than 0.1 μm in diameter, and where the water has an average flow rate of at least 0.1 liter per minute through the filter with a head pressure of between approximately 0.1 and 1.0 psi.

(CX-0042 (’372 Application) at [0017].).

Dr. Freeman opined that the ’372 application inherently discloses the FRAP factor by describing working examples and at paragraph 118, the ’372 application describes the four variables that appear in the FRAP factor. (Tr. (Freeman) at 1546:13-1547:1.).

For example, Dr. Freeman testified that:

> So the ’372 application does not have the FRAP factor explicitly written and disclosed in it, but I believe that the filters with this performance are inherently disclosed in the ’372 application.
>
> Q. First of all, where do you find that disclosure in the ’372 application?
>
> A. So the ’372 application discloses a number of working examples, and they also mention under the performance section, at paragraph 118, that the other embodiments include filters for use in gravity flow or low-pressure applications that meet a specific performance range of operation defined by filter volume, defined usage lifetime, average time of filtration, and/or lead reduction ability, and those are the four variables that appear in the FRAP equation.

(Tr. (Freeman) at 1546:18-1547:1; *see also id.* at 1545:8-1554:14 (describing written support in the ’372 application for the asserted claims).).

As depicted in Table No. 4 below, Table XIII of the ’372 application lists cup-shaped filters that were made and tested, and for each filter, lists lifetime **L**, average filtration unit time **f**, volume **V** in cubic centimeters, and effluent lead concentration $\mathbf{c_e}$ in parts per billion, but fails to explicitly calculate the FRAP factor. (*Id*. at 1547:23-1548:11.). Dr. Freeman testified that the variables in the ’372 application are equivalent to the same definitions used in the ’141 patent. (*Id*. at 1549:15-19.).

Public Version

Table No. 4: Table XIII from the '372 application

Table XIII

Filter	*L* (gallons)	*f* (min/liter)	V (cm^3)	C_e (mg/liter)
Cup-Shaped:				
FA1-1	40	3.5	99.7	6.9
FA1-3	40	3.6	99.7	17.3
FA2-3	40	3.4	99.7	6.9
FA2-4	40	2.6	99.7	20.3
FA3-2	40	3.0	99.7	6.9
FT2-1	40	2.9	99.7	7.8
FT2-3	40	2.9	99.7	17.4
PA1-1	40	9.8	99.7	3.4
PA1-2	40	10.9	99.7	3.9
PA2-1	40	9.9	99.7	3.1
PA2-2	40	8.2	99.7	2.1
PA2-3	40	9.5	99.7	4.2
PA3-2	40	7.9	99.7	11.2
PA3-3	40	10.2	99.7	4.7
PT2-1	40	8.0	99.7	4.7
PT2-2	40	7.2	99.7	10.2
PT2-3	40	7.7	99.7	4.5
Mixed Media:				
Brita Granular	40	5.5	128	42.2
German Maxtra	40	4.9	145	43.8
Pur 2 stage w/ timer	40	16.0	141	30.2
Pur 2 stage w/ timer	40	10.4	141	36.6
Pur 2 stage w/ timer	40	11.0	141	38.6

[00176.] As evident from Table XIII, the cup-shaped filters exhibited superior lead removal and fast flow rates.

(CX-0042 ('372 Application) at [00175]-[00176], Table XIII (showing basis for the FRAP variables **V**, **f**, **L** and **c**$_e$); *see also* Tr. (Freeman) at 1547:23-1547:6.).[60]

c) The '372 Application's Disclosure of Volume and Average Filtration Unit Time and Asserted Claims 3-6

Dr. Freeman testified that the '372 application describes preferred embodiments with a volume of filter media **V** of less than about 300 cm^3 and more preferably less than about 150 cm^3, which "matches up" with the '141 patent disclosure. (Tr. (Freeman) at 1549:24-1550:8; 1553:4-11.). These same volume values are described in asserted claims 3 and 4. (JX-0022 at

[60] Respondents indicated that they would file a motion to strike related to Dr. Freeman's opinions about Table XIII, filter PA 3-2 as not being in Dr. Freeman's report or deposition. (Tr. (Swain) at 1548:14-19; 1650:5-9.). The motion was not subsequently filed.

cls. 3-4.).

Dr. Freeman testified that the ’372 application at paragraph 124 describes average filtration unit time **f** in the same manner as in the ’141 patent, and paragraph 124 lists examples of 12 minutes per liter and 6 minutes per liter. (Tr. (Freeman) at 1550:10-20; 1553:16-25.). These same average filtration unit time values are in asserted claims 5 and 6. (JX-0022 at cls. 5-6.).

d) The ’372 Application’s Disclosure of Effluent Lead Concentration

Dr. Freeman testified that the ’372 application describes at paragraph 119 that the effluent lead concentration in the final liter of effluent water is less than 10 micrograms per liter, and source water is prepared as defined in the 2007 NSF/ANSI 53 protocol. (Tr. (Freeman) at 1551:4-11.). Dr. Freeman opined that source water defined by that protocol is within the scope of source water as in asserted claim 1. (*Id*. at 1551:12-16.). As found above, source water prepared according to the 2007 NSF/ANSI 53 protocol meets the limitation for source water in asserted claim 1. (*See* IX(A)(2), *supra*.). Accordingly, the ’372 application source water description provides written description support of the source water limitation of the FRAP factor in asserted claim 1.

e) The ’372 Application’s Disclosure of Lifetime

Dr. Freeman testified that the ’372 application describes at paragraph 125 that the “lifetime L may be defined as the total number of gallons that can be effectively filtered according to claims presented by the manufacturer or seller of the filter.” (Tr. (Freeman) at 1551:4-11.). Dr. Freeman opined that source water defined by that protocol is within the scope of source water as in asserted claim 1. (*Id*. at 1551:12-16.). The lifetime **L** in the ’372 application meets the lifetime limitation of the FRAP factor in asserted claim 1.

Public Version

f) The ’372 Application’s Disclosure of FRAP Factor Values and Asserted Claims 1-2

Dr. Freeman calculated the FRAP values using the values of variables described in the ’372 application, but used a volume value of 105 cm^3 as amended during the prosecution of the ’372 application. (*Id*. at 1548:21-1549:14; *see* CX-0042, page 5 of “Response to Non-Final Office Action with a 5-month extension fee” filed on March 12, 2012 (amending volume value).).

Dr. Freeman determined that the FRAP factor as reflected in the ’372 application ranged “from about 20 to something over a hundred.” (*Id*.). These values meet the claimed FRAP factor values in the asserted claims 1 and 2 because they are less than 350, or less than 200. (JX-0022 at cls. 1-2.).

g) The ’372 Application’s Disclosure of Asserted Claim 23

Dr. Freeman testified that the ’372 application has written description support for claim 23 at Figure 1, which depicts a container/pitcher, source water reservoir and filtered water reservoir, and a cartridge in communication with the two, and a filter inside the cartridge. (Tr. (Freeman) at 1554:5-14.). Figure 1 in combination with the disclosure of claim 1 in the ’372 application provide written description support for claim 23.

The ’372 application describes the FRAP factor variables and water filters with sufficient disclosure to calculate the FRAP factor values. Accordingly, the water filters described in the ’372 application provide written description support for the FRAP factor values through inherency.

h) PTAB Consideration of Priority to the ’372 Application

The Patent Trial and Appeal Board (“PTAB”) considered and granted the priority claim of the ’141 patent to the ’372 application. (*See* below.). In *PowerOasis*, the Federal Circuit

explained that when the PTO has failed to consider priority claims, the patentee has some burden to show entitlement to priority. *PowerOasis,* 522 F.3d at 1304-06. However, here, unlike in *PowerOasis*, the PTO has considered the priority claim in a detailed decision, as explained below.

On March 31, 2017, the PTAB denied institution of an *inter partes* review ("IPR") with respect to the unpatentability of claims 1-24 of the '141 patent. (JX-0023.0746 – 0770 (Prosecution history of the '141 patent, Decision Denying Institution of *Inter Partes* Review, *Kaz USA, Inc. v. Brita LP*, IPR 2016-01893, Paper 16 (PTAB Mar. 31, 2017)) ("IPR Denial").). In its decision denying institution, the PTAB found written support for the FRAP formula by treating the FRAP factor as a property of the water filter that was inherently disclosed in the '372 application. (RPBr. at 55; CBr. at 72-73 (citing IPR Denial at 10); IPR Denial at 13.). The IPR denial found written description support for the '141 patent in the '372 application and stated: "[t]he description of the FRAP factor in the '141 patent is a disclosure of an inherent property of the product disclosed in the '372 Application, and, thus, the inclusion of the FRAP factor in the '141 patent claims does not deprive that product of the benefit of the '372 Application's October 27, 2007 filing date." (*Id*. (citing *Kennecott*, 835 F.2d at 1423).).

In attorney argument, Respondents contended that the PTAB's finding that there is written support for the '141 patent in the '372 application is factually incorrect. (RPBr. at 55; *see also* RSRBr. at 3 (citing *Certain Adjustable Keyboard Support Systems*, Inv. No. 337-TA-670, Publ. No. 4285, Comm'n Op. at 79 (Nov. 1, 2011) ("*Adjustable Keyboard*").).

Here, the PTO has already given a detailed decision in the IPR Denial, which analyzed priority to the '372 application and found that the '141 patent was entitled to claim priority to the '372 application. Additionally, Brita has presented reliable, compelling, contemporaneous

evidence that the claims have written description support in the ’372 application.

i) Written Description and Enablement of the Full Scope of the Asserted Claims

Brita argued that the ’372 application satisfies the enablement requirement. (CPBr. at 59-60; CSBr. at 24-28). Respondents disputed that the ’372 application enables the full scope of the asserted claims. (RPBr. at 57-60 (arguing about the breadth of the types of filters, no disclosure of FRAP factor formula).).

In Post-Hearing briefing, Respondents argued about possession and enablement of the full scope of the invention. Respondents argued that the ’372 application, like the ’141 patent, only discloses carbon block filter types and disparages non-carbon block filters. (RSRBr. at 3-4 (citing CX-0042.0031-48, 0050-53, 0136 where the ’372 application describes and claims carbon block filters).). Respondents argued that the ’372 application, like the ’141 patent, failed to show possession of the entire range of FRAP factor values. (*Id.* at 5.). Respondents contended that the disclosure of only two volumes, 99 cm^3 or 151 cm^3, the best effluent concentration $\mathbf{c_e}$ of 2.1, and best FRAP factor value of 22, do not demonstrate possession of the full range of FRAP factor values. (*Id*. (citing CX-0042.0047-49).).

As explained more fully below, the presence of working examples in the ’372 application, and the findings of state of the art, level of skill, and nature and context of the invention found with respect to the ’141 patent also apply to the ’372 application. (*See* Sections XII(C), XII(D), which are repeated here.).

i. Written Description of the Full Scope

The ’372 application describes a working example, PA2-2, that meets the FRAP factor limitation. (*See* Table 4, *supra*; Section XII(A)(2)(c) (reduction to practice of PA2-2).). As discussed above, the FRAP factor is met inherently. (*See* Section XII(A)(4)(a), *supra*.).

Moreover, the ’372 application describes, like the ’141 patent, that the “nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed media, carbon blocks, non-wovens, hollow fibers and other filtration formats.” (CX-0042 at ¶ 118; Tr. (Freeman) at 1557:18-1558:17 (testifying that the discussion of other filter media embodiments “ties in with all the information that a person of skill in the art would have in the field to access to help in making that transition from one filter media to another.”).). The ’372 application also describes that filter sheets enhance the performance of porous composite carbon block media. (CX-0042 at ¶ 95; Tr. (Freeman) at 1558:20-1559:2.). Accordingly, like the ’141 patent, the ’372 application discloses filter media embodiments other than carbon block.

The factors: (a) the existing knowledge in the field of water filtration and filter types; (b) the extent and content of the prior art of water filtration and filter types; (c) the maturity of the science of water filtration; and (d) the predictability of filter media in gravity-fed water filters, all support a factual finding that the disclosure of the ’372 application, like the ’141 patent, on the described issues meet the written description requirement. (*See* Section XII(C)(4), (4)(iv), *infra*.). The existing knowledge before 2007 also supports a factual finding that the various filter types that have chemical and mechanical filtration were well-known in the art. (*See* Section XII(C)(4)(iv), *infra*.).

The weight of the evidence, together with Dr. Freeman’s testimony supports a factual finding that the ’372 application, like the ’141 patent, discloses working examples for carbon block technology, such that the written description requirement is met for the ’372 application. (*See* Section XII(C)(4)(iv), *infra*.).

ii. Enablement of the Full Scope

The findings described immediately above about written description and working examples also apply to enablement of the full scope of the claimed invention. The findings on the *Wands* factors, below on the ’141 patent, also apply to the ’372 application and are repeated here. (*See* Section, XII(D).). The evidence supports a finding that the state of the art and relative skill of a skilled artisan were advanced at the time the invention was made. (*See* Sections XII(D)(2)(e), (f), *infra*.).

An analysis of the relevant *Wands* factors favors a finding both of law, and by the facts that support the law, that that the full scope of all the asserted claims of the ’372 application, like the ’141 patent are enabled. Water filtration was well-known (*Wands* factor 5), those skilled in the art used established techniques and materials (*Wands* factor 6) such that the quantity of experimentation is not unreasonable (*Wands* factor 1). Although there is a lack of working examples for the full scope (*Wands* factor 3), this is not detrimental when weighed against the remaining factors. The claims are broad (*Wands* factor 8), but when taken in context of the remaining *Wands* factors, this factor alone does not outweigh the other factors to support a finding of undue experimentation.

For the above reasons, it is a finding that based on an analysis of the *Wands* factors and the totality of the weight of the evidence, that a person of skill in the art could practice the invention without undue experimentation to achieve: (i) the full scope of the FRAP factor; and (ii) carbon block filters and other types of filters.

Accordingly, the ’372 application has possession and enablement of the disputed ranges.

As explained above, the ’372 application has written description support for the asserted claims that entitles the ’141 patent to priority to the ’372 application. For the foregoing reasons,

the ’141 patent is entitled to the benefit of the filing date of the ’372 application, October 29, 2007.

Accordingly, for the reasons explained above, the invention of the ’141 patent has actual reduction to practice on July 25, 2006. As a matter of fact and law, the ’141 patent is entitled to priority to October 29, 2007, the filing date of the ’372 application.

B. Anticipation[61]

1. Legal Standard

A determination that a patent is invalid as being anticipated under 35 U.S.C. § 102 requires a finding, based upon clear and convincing evidence, that each and every limitation is found either expressly or inherently in a single prior art reference. *See Celeritas Techs. Inc. v. Rockwell Int’l Corp*., 150 F.3d 1354, 1361 (Fed. Cir. 1998). Anticipation is a question of fact, including whether a limitation, or element, is inherent in the prior art. *In re Gleave*, 560 F.3d 1331, 1334-35 (Fed. Cir. 2009). The limitations must be arranged or combined the same way as in the claimed invention, although an identity of terminology is not required. *Id.* at 1334 (“the reference need not satisfy an *ipsissimis verbis* test”); MPEP § 2131.

In addition, the prior art reference’s disclosure must enable one of ordinary skill in the art to practice the claimed invention “without undue experimentation.” *Gleave*, 560 F.3d at 1334-35. A prior art reference that allegedly anticipates the claims of a patent is presumed enabled; however, a patentee may present evidence of nonenablement to overcome this presumption. *Impax Labs., Inc. v. Aventis Pharmaceuticals Inc*., 468 F.3d 1366, 1382 (Fed. Cir. 2006).

[61] The Parties did not adduce at trial, nor did they include in their Post-Hearing briefing, evidence to support their arguments about obviousness or whether objective indicia of nonobviousness support nonobviousness. (Doc ID No. 783521 (Joint Outline of Issues) (Nov. 1, 2022) at 4-5.). Consequently, Respondents have withdrawn, waived and/or abandoned arguments under 35 U.S.C. § 103 consistent with Ground Rules 7.2 and 10.1.

"[W]hether a prior art reference is enabling is a question of law based upon underlying factual findings." *Gleave*, 560 F.3d at 1335.

2. The Alleged Prior Art Products

Respondents asserted four (4) grounds of anticipation. (RBr. at 26-51.). It is Respondents' burden to prove that each anticipatory product: (i) was available before Brita's ***July 25, 2006*** date of conception under 35 U.S.C. § 102(a) (Pre-AIA); or (ii) was on sale or in public use one year before the ***October 29, 2006*** filing date of the '372 application, to which the '141 patent claims priority, under 35 U.S.C. § 102(b) (Pre-AIA). (*See* Section XII(A), *supra* (Priority Date of the '141 Patent).). For the reasons discussed below, the Brita Legacy Granular, Dupont WF-PTC 100 (2005), and ZeroWater ZP-201 Filters constitute prior art under 35 U.S.C. § 102(a) (Pre-AIA) or § 102(b) (Pre-AIA) ("Prior Art Products").

a) PUR 1-Stage Filters (1450 and 1450Z)

Mr. Mitchell, the Director of Advanced Technologies at Respondent Helen of Troy and Respondents' fact witness, testified that the PUR 1-Stage was sold by Proctor & Gamble at least as early as 2003 and was continuously sold from 2005 under model numbers CRF-1450 and CRF-1450Z ("PUR 1-Stage Filters"), both of which contained the same filter media type and volume. (Tr. (Mitchell) at 756:19-760:3; *see also* RDX-0007C.0018.). In addition to Mr. Mitchell's testimony and the exhibits he discussed therein, Respondents relied on RPX-0150C and RX-2250C, both of which are spreadsheets that purportedly show Walmart's sales of the PUR 1-Stage Filters. (RBr. at 21 (citing RPX-0150C at 16-25 (referring to UPC 72398700665 (1-Stage single pack); UPC 72398700667 (three pack); RX-2550C (same)) (other citations omitted).). Respondents also cited to RX-0246, a Lowes sales document. (*Id.* (citing RX-0246).).

As Brita pointed out, although the Walmart sales documents contain entries for a "1-STAGE FILTER 1-PK" (UPC 72398700665) and "PUR ADVANTAGE 3-PACK" (UPC 72398700667), highlighted below in Table No. 5, the documents do not specifically indicate that these entries refer to a CRF-1450 or to a CRF-1450Z filter. (CRBr. at 9; RPX-0150C; RX-2550C.).

Table No. 5: [redacted]

[redacted]

(RPX-0150C at 16 (annotated).).

Respondents failed to cite to any additional evidence that would prove or even indicate which filter model(s) Walmart actually sold. Moreover, as Brita noted, for the CRF-1450 and CRF-1450Z models, the Lowes sales document, Table No. 6 below, upon which Respondents relied lists "N/A" for the item number and the "First Sale Date" column is blank. (CRBr. at 9.).

Table No. 6: [redacted]

[redacted]

(RX-0246C (annotated).).

For these reasons, Respondents have not proven that the CRF-1450 and CRF-1450Z models of the PUR 1-Stage Filters qualify as prior art under 35 U.S.C. § 102(a) or § 102(b).

b) Brita Legacy Granular Filter (1999)

Respondents' expert, Mr. Herman, confirmed that the Brita Legacy Granular Filter ("Brita Legacy Filter") is prior art as shown in the '141 patent and that it was continuously sold in the United States from 1999 through 2006. (Tr. (Herman) at 1036:12-1038:1; JX-0022 at Tables 3 and 5; RDX-0007C.0019.). Table Nos. 7 and 8, below, are excerpts taken from Tables 3 and 5 of the '141 patent, respectively.

Table No. 7: Excerpt from Table 3 of the '141 Patent

TABLE 3

Liters Filtered	3 L	76 L	151 L	227 L	273 L	303 L	average
Brita Granular							
Effluent Total Pb Conc. (ppb)	39.30	40.86	42.21	42.50	46.15	41.27	42.05
Influent Total Pb Conc. (ppb)	170.10	160.00	182.70	171.90	167.60	164.70	169.50
Influent Sol. Pb Con. (ppb)	118.30	109.90	107.60	117.50	116.90	115.40	
% Colloidal Particulate Influent	30.5%	31.3%	41.1%	31.6%	30.3%	29.9%	32.5%
% Total Pb Removed	76.9	74.5	76.9	75.3	72.5	74.9	
Flow Rate (min./liter)	0:02:50	0:06:05	0:05:28	0:05:59	0:06:17	0:06:33	0:05:32

(JX-0022 at Table 3.).

Table No. 8: Excerpt from Table 5 of the '141 Patent

TABLE 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Mixed Media:					
Brita Granular	40	5.5	128	42.2	386.7

(JX-0022 at Table 5.).

Mr. Herman analyzed the tested Brita Legacy Filters, as well as several other Brita vintages from 1996-2005, and concluded that the Brita Legacy Filter did not materially change from 1999 through 2005. (Tr. (Herman) at 1036:2-8.).

Thus, Respondents have proven that the Brita Legacy Filter was known and used in the United States under 102(a), and was sold, offered for sale, and/or in public use under 102(b) no later than April of 2006.

c) Dupont WF-PTC 100 Filter (2005 and 2007)

As an initial matter, it appears that Respondents are no longer asserting their invalidity ground based on the 2007 version of the Dupont WF-PTC 100 Filter. (*See* RPBr. at 81-83.). In their Post-Hearing Brief, they stated that "Respondents base their claim on the 2005 versions of the PTC-100 filters." (RBr. at 37.). Thus, Respondents have waived or abandoned any argument with respect to the 2007 version of the Dupont WF-PTC 100 filter under Ground Rule 10.1.

Respondents provided evidence that the 2005 version of the Dupont WF-PTC 100 Filter ("Dupont Filter" or "WF-PTC 100 Filter") was offered for sale and sold starting in [redacted]. (Tr. (Herman) at 1042:4-1043:5; RX-0111C; RPX-108; RPX-0149C.). Brita itself recognized the existence of the Dupont Filter in [redacted] in internal market competitive analyses. (Tr. (Herman) at 1043:10-1044:3; RX-0473C at BRITALP-0059694 – 59704.). Thus, the Dupont Filter is prior art under 102(a) and 102(b) because it was

known, used, sold, in public use and/or the subject of an offer for sale prior to July 2006.

The corporate representative for Protect Plus, Mr. Glenn Cueman,[62] confirmed that the initial version of the WF-PTC100 was sold [redacted]. He also verified the Helen of Troy and QFT tested versions of the WF-PTC 100 (QFT 4A, 4B and IT1370) are authentic versions of the WF-PTC 100 filter that was sold in [redacted]. (RX-2605C (Cueman Dep. Tr.) at 45:11-49:4; RX-0858 – RX-0861.). The lot code on the packaging on the tested PTC-100 filters read [redacted]. (*See* RPX-0117.0006); RPX-0108.0006 ([redacted]); RX-0858 – RX-0861.).

Accordingly, the 2005 version of the Dupont WF-PTC 100 Filter is prior art under 35 U.S.C. § 102(a) and/or § 102(b).

d) ZeroWater ZF-201 Filter

Mr. Kellam, the President of Zero Technologies LLC, testified that the ZeroWater ZF-201 Filter ("ZF-201 Filter") was made, sold, and used in the United States at least as early as 2006 (Tr. (Kellam) 864:3-865:11), and no later than September 7, 2006 to the Home Depot. (Tr. (Kellam) 847:19-848:17, 849:20-850:17 (referring to RX-0779C at ZTI00012883), 866:20-869:9 (discussing RX-0810C at ZTI00016437), 872:18-873:874 (discussing RX-0810C at ZTI00016438-16440, 16545; RX-0810C at ZTI00016437, 16438-16440, 16545; RX-0779C at ZTI00012873-12874, 12883).).

Mr. Kellam confirmed that there were no changes to the ZF-201 Filter from its first sale at least as early as September 7, 2006 until sometime in late 2011 or early 2012. (Tr. (Kellam) 862:14-863:4.).

[62] Mr. Glenn Cueman testified during his deposition on June 16, 2022 that he was a co-founder of Protect Plus. (RX-2605C (Cueman Dep. Tr.) at 12:1-13:18.).

Accordingly, the 2005 version of the ZeroWater ZF-201 Filter is prior art under 35 U.S.C. § 102(a) and/or § 102(b).

3. The Prior Art Products Do Not Anticipate Claim 1 of the '141 Patent

As an initial matter, Brita did not dispute that the PUR 1-Stage, Brita Legacy, and Dupont Filters are "gravity-fed water filter[s] comprising filter media including at least activated carbon and a lead scavenger." (CPBr. at 75-85; CRBr. at 27-36; JX-0022 at cl. 1.). Brita also did not contest any measurements regarding V, i.e., "the volume of the filter media (cm^3)." (CPBr. at 75-85; CRBr. at 27-36; JX-0022 at cl. 1.).

Brita argued that Respondents failed to demonstrate that these filters achieved a FRAP factor less than 350. (CRBr. at 27.). Specifically, Brita contended that Mr. Herman used erroneous or unreliable values for: (i) lifetime (L); (ii) average filtration unit over lifetime (f); and (iii) lead effluent concentration at end of lifetime (c_e). (*Id.*). The contested limitations are addressed below. In sum, Respondents did not prove by clear and convincing evidence the Prior Art Products anticipate any of the asserted claims.

a) PUR 1-Stage Filters

As discussed above in Section XII(B)(2), Respondents failed to demonstrate that the 1450 and 1450Z variants of the PUR 1-Stage were sold during the relevant time period. Moreover, in addition to the general failures in Respondents' testing as discussed above in Section IX(B), Respondents failed to prove by clear and convincing evidence that claim 1 is anticipated by the PUR 1-Stage Filters for the reasons discussed below.

i. "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"

Respondents argued that the PUR 1-Stage Filters "had an NSF 53 certified lifetime of 40 gallons as of 2005 on its packaging." (RBr. at 29 (citing Tr. (Herman) at 1049:21-1050:6; RPX-

0110.0004-5; RPX-0111; RPX-0113).).[63] As an initial matter, the packaging upon which Respondents relied indicate that the filters were certified under NSF 42 for the reduction of chlorine, not for NSF 53, as shown below in Figure No. 21.

Figure No. 21: Packaging for PUR 1-Stage Filters

(RPX-0110.0005; *see also* RPX-0111.0004; RPX-0113.0006.).

Respondents' expert, Mr. Herman, confirmed this during the Hearing. (Tr. (Herman) at 1216:10-15.). Thus, as Brita pointed out, the PUR 1-Stage Filters are not certified for 40 gallons under the NSF/ANSI 53 (2007) standard. (CRBr. at 34.). Nevertheless, as discussed above in Section VIII(B) with respect to the NSF/ANSI 53 (2007) standard, the '141 patent does not require the NSF/ANSI 53 standard (2007).

The packaging does specify that the PUR 1-Stage Filters have a lifetime of 40 gallons, as Respondents contended, and as is replicated below in Figure No. 22. (RBr. at 29.).

[63] Respondents also cited RX-0334C-RX-0339C. (RBr. at 29.). Those exhibits are not in evidence.

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Figure No. 22: Packaging for PUR 1-Stage Filters

(RPX-0113.0004; *see also* RPX-0110.0004; RPX-0111.0003.).

Respondents' reliance on the packaging that the PUR 1-Stage Filters have a lifetime of 40 gallons is entirely consistent with the specification of the '141 patent.

> The filter usage lifetime (L) is defined as the total number of gallons that can be effectively filtered according to claims presented by the manufacturer or seller of the filter. Typically these claims are present on the ***product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed***. The lifetime claims may also be presented in the manufacturers or seller's advertising. Such claims typically bear some relationship to some performance attribute of the filter.

(JX-0022 at 26:6-17 (emphasis added).).

Brita argued that "Respondents offered no evidence that the PUR 1-Stage filter had a lifetime validated by testing using the challenge water of claim 1" because "Mr. Herman relies on the lifetime value purportedly based . . . on the packaging and the PUR 1-Stage filter's certification under a pre-2007 version of the NSF/ANSI 53 standard that did not have a particulate lead requirement." (CRBr. at 34 (citing Tr. (Herman) at 1049:21-1050:6, 1016:5-19, 1165:24-1166:7).). Contrary to Brita's assertion, lifetime as claimed in claim 1 only requires "filter usage lifetime claimed by a manufacture or seller of the filter (gallons)." (JX-0022 at cl. 1.). This is consistent with the adopted construction of "filter usage lifetime claimed by a

manufacturer or seller of the filter," i.e., "[t]he total number of gallons of water that a manufacturer or seller has validated can be filtered before the filter is replaced." (*Markman* Order at 14.).

There is no requirement in claim 1 or the adopted claim construction in the *Markman* Order that lifetime must be "validated by testing using the challenge water of claim 1" or that it must be certified under a standard that has a particulate lead requirement like the NSF/ANSI 53 standard (2007). The challenge water (preparation and testing) is significant for purposes of establishing an accurate, reliable scientific methodology, as discussed above in Section IX, but it is not relevant to whether the PUR Stage-1 Filters meet this claim limitation. Moreover, as noted in the *Markman* Order, the '141 patent references the NSF/ANSI 53 standard (2007) as a "***default*** method to calculate the lifetime," and not as the ***only*** way to calculate lifetime. (*Markman* Order at 16-17 (emphasis added).).

Additionally, Brita pointed out that testing of the PUR Stage-1 Filters provided "additional confirmation" that the PUR 1-Stage Filters' lifetime "is not 40 gallons" because "[e]xceeding 10 ppb in effluent lead concentration would prevent a filter from certification under the NSF/ANSI 53 (2007) standard." (CRBr. at 35 (citations omitted).). Again, Brita's position that the NSF/ANSI 53 (2007) standard is required is misguided.

Accordingly, Respondents have proven by clear and convincing evidence that the PUR 1-Stage Filters satisfy this claim limitation.

ii. "F = average filtration unit time over lifetime L (min/liter)"

Brita argued that Mr. Herman erroneously calculated the average filtration unit time over lifetime because instead of measuring this parameter for each filtered liter, Mr. Herman measured only 5 liters of the alleged 152-liter (40 gallons) lifetime. (CRBr. at 35 (citing RX-

0985.0021-22, 0025).). However, as discussed in Section IX with respect to the Parties' testing protocols, Brita's contention that every liter must be measured was expressly rejected. (*See* Section IX(A), *supra*.).

Mr. Herman tested four samples of the PUR 1-Stage Filters and concluded they had an average flow rate of 6.51, 5.84, 11.16, and 6.21 min/L. (Tr. (Herman) at 1061:23-1062:11; RX-0684; RX-0986C).). As Respondents noted, these results are consistent with the average flow rate of 4.78 min/L Brita obtained in its own prior art testing of the PUR 1-Stage Filters. (Tr. (Nishijima) at 359:23-360:13; RX-0555).).

Thus, Respondents have proven by clear and convincing evidence that the PUR 1-Stage Filters satisfy this claim limitation.

iii. "c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter"

As discussed in Section IX(B), the challenge water that QFT and Helen of Troy used for their testing of the PUR 1-Stage Filter did not comply with the soluble lead requirement specified in the claims of the '141 patent. (*See* Section IX(B), *supra*; RX-0985.0023, 0025 (particulate lead and soluble lead levels outside limits recited by claim 1 during testing of samples 5A, 5B, and IT1371).). Moreover, the effluent values Mr. Herman reported ranged from 5.7 µg/L (QFT 7A) to 12.1 µg/L (IT1371). (RX-0985.0002-0003.).

As Brita noted, the inconsistent measurements of flow rates and effluent concentrations are material because they undermine the representativeness of these filters, the overall reliability of Mr. Herman's testing, and whether the evidence accurately shows the inherent properties of these filters.

For the foregoing reasons, Respondents failed to prove by clear and convincing evidence

that the PUR 1-Stage Filters satisfy this claim limitation.

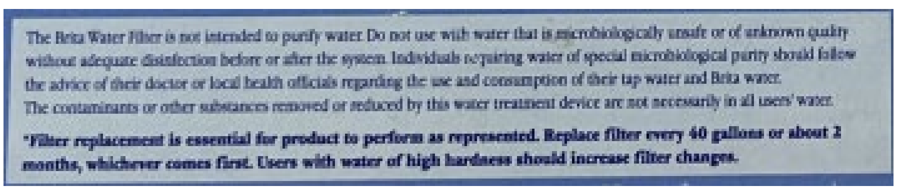
b) Brita Legacy Filter

In addition to the general failures in Respondents' testing as discussed above in Section IX(B), Respondents failed to prove by clear and convincing evidence that claim 1 is anticipated by the Brita Legacy Filter for the following reasons.

i. "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"

Respondents contended that the Brita Legacy Filter "had a lifetime of 40 gallons as they were certified for lead reduction up to 40 gallons under NSF 53 on September 4, 1998." (RBr. at 34 (citing Tr. (Herman) at 1050:7-1051:25; RPX-0106; RPX-0107).). The packaging that Respondents provided supports their contention, reproduced below in Figure No. 23.

Figure No. 23: Packaging of Brita Legacy Filter



(*See* RPX-0106.0002.).

Brita raised similar arguments for the Brita Legacy Filter as it did for the PUR 1-Stage Filters, namely, that the filter "was neither certified for 40 gallons under the NSF/ANSI 53 (2007) standard nor validated for 40 gallons under any other method using the challenge water as recited in claim 1." (CRBr. at 28.). However, as discussed above with respect the PUR 1-Stage Filters, nothing in this claim limitation or in the specification of the '141 patent requires lifetime to be certified under the NSF/ANSI 53 (2007) standard or validated using the challenge water recited in claim 1. (*See* Section XII(B)(3)(a), *supra*.).

As the packaging indicates, the Brita Legacy Filter has a lifetime of 40 gallons, which the

specification discloses is a "typical[]" way of determining lifetime. (RPX-0106.0002; JX-0022 at 26:6-13 ("Typically these claims are present on the product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed").). This is also expressly displayed in Table 5 of the '141 patent. (JX-0022 at Table 5.).

For these reasons, Respondents have proven by clear and convincing evidence that the Brita Legacy Filter satisfies this claim limitation.

ii. "F = average filtration unit time over lifetime L (min/liter)"

Brita contended that Mr. Herman erroneously calculated the average filtration unit time over lifetime for the same reason as the PUR 1-Stage Filters, i.e., Mr. Herman measured only 5 liters of the alleged 152-liter (40 gallons) lifetime rather than measuring every filtered liter. (CRBr. at 29 (citing RX-0985.0021-22).). However, as discussed in Section IX with respect to the Parties' testing protocols, Brita's contention that every liter must be measured was squarely rejected. (*See* Section, IX(A), *supra*.).

Mr. Herman tested two samples of the Brita Legacy Filter and concluded that it had an average flow rate of 5.42 and 5.79 min/L. (Tr. (Herman) at 1062:12-2.1.). As Respondents noted, this is consistent with the '141 patent's portrayal of the average flow rate of the Brita Legacy Filter as 5.5 min/L. (RBr. at 35 (citing JX-0022 at Table 5).).

Accordingly, Respondents have proven by clear and convincing evidence that the Brita Legacy Filter satisfies this claim limitation.

iii. "c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter"

For the reasons set forth in Section IX(B) with respect to the Parties' testing protocols,

the challenge water used in the testing conducted at QFT and Helen of Troy did not comply with the soluble lead requirement specified in the claims of the '141 patent. (*See* RX-0985.0023 (soluble lead levels outside limits recited by claim 1 during testing of samples 3A and 3B).).

Accordingly, Respondents failed to prove by clear and convincing evidence that the Brita Legacy Filter satisfies this claim limitation.

c) Dupont WF-PTC 100 Filter

In addition to the general failures in Respondents' testing as discussed above in Section IX(B), Respondents failed to prove by clear and convincing evidence that claim 1 is anticipated by the Dupont WF-PTC 100 Filter for the reasons discussed below.

i. "L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons)"

Respondents asserted that the WF-PTC 100 Filters sold in 2005-2008 had a gallon lifetime stated as 40 gallons on the packaging and certified under NSF 53. (Tr. (Herman) at 1052:5-16; RPX-0103.0003-4; RPX-0104.0004; RPX-0108.0001.). The packaging, reproduced below in Figure No. 24, that Respondents provided support this contention.

Figure No. 24: Packaging of WF-PTC 100 Filter

(RPX-0103.0003-4; *see also* RPX-0104.0004.).

Again, Brita argued that the WF-PTC 100 Filter "was neither certified for 40 gallons under the NSF/ANSI 53 (2007) standard nor validated for 40 gallons under any other method using the challenge water as recited in claim 1." (CRBr. at 31.). For the reasons discussed above with respect to the lifetimes of the PUR 1-Stage and Brita Legacy Filters, Brita's argument is not persuasive.

Accordingly, Respondents have proved by clear and convincing evidence that the WF-PTC 100 Filter satisfies this claim limitation.

ii. "F = average filtration unit time over lifetime L (min/liter)"

Again, Brita asserted that Mr. Herman erroneously calculated the average filtration unit time over lifetime because he failed to measure this parameter for each filtered liter of the alleged 152-liter (40 gallons) lifetime. (CRBr. at 32 (citing RX-0985.0021-22, 0025).). However, as discussed in Section IX with respect to the Parties' testing protocols, Brita's assertion that every liter must be measured was expressly rejected. (*See* Section IX(A), *supra*.).

Mr. Herman tested three samples of the Dupont WF-PTC 100 Filter and concluded that the filter had an average flow rate of 10.28, 10.60, and 5.05. (Tr. (Herman) at 1063:2-10; RX-0986C.). As Respondents noted, this is consistent with Brita's own contemporaneous testing of the Dupont WF-PTC 100 Filter in 2005. (RBr. at 39.). There, Brita not only acknowledged that the Dupont WF-PTC 100 Filter had a flow rate of around 7 - 10.4 min/liter, but also recognized that the filters were claiming to be able to reduce lead. (Tr. (Herman) at 1068:10-1069:5; RX-0473C at BRITALP-0059694 – 59704.).

Thus, Respondents have proven by clear and convincing evidence that the Dupont WF-PTC 100 Filter satisfies this claim limitation.

iii. "c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter"

Like the PUR 1-Stage Filters and the Brita Legacy Filter, the challenge water QFT and Helen of Troy used for their testing of the Dupont WF-PTC 100 filter did not comply with the soluble lead requirement specified in the claims of the '141 patent. (*See* Section IX(B), *supra*; RX-0985.0023, 0025 (particulate lead and soluble lead levels outside limits recited by claim 1 during testing of samples 4A, 4B, and IT1370).

For the foregoing reasons, Respondents failed to prove by clear and convincing evidence that the Dupont WF-PTC 100 satisfies this claim limitation.

d) ZeroWater ZF-201 Filter

As discussed above in Section IX(E)(2), Respondents did not actually test the ZF-201 Filter but instead, "used . . . information from testing and documents from the 2006-2007 period" to calculate the FRAP value of the ZF-201 Filter. (Tr. (Herman) at 1028:15-16.). The evidence Respondents relied upon to prove the characteristics of the ZF-201 Filter are either undated or dated after September 2006. Accordingly, they do not clearly demonstrate what the FRAP factor would have been for the filter when it was allegedly first sold to Home Depot in September 2006. (*See* Section IX(E)(2), *supra*.). Moreover, because no physical samples of the ZF-201 Filter were produced in this Investigation, none of the experts were able to perform their own analyses of the filter. (Tr. Kellam) at 898:17-899:1.). As a result, Respondents failed to offer expert testimony that the ZF-201 Filter actually anticipates the '141 patent.

4. The Prior Art Products Do Not Anticipate Claims 2-6 and 23 of the ’141 Patent

Respondents asserted that the Prior Art Products anticipate claims 2-6 and 23[64] for the same reasons set forth in connection with claim 1. (RBr. at 32-33, 36-37, 41-42, 50-51.). Because the Prior Art Products do not anticipate claim 1, Respondents likewise failed to prove by clear and convincing evidence that these products anticipate claims 2-6 and 23 of the ’141 patent. (*See* Section XII(B)(3), *supra*.).

C. Written Description

1. Written Description Requirement

In pertinent part, 35 U.S.C. § 112, states the written description requirement:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

35 U.S.C. § 112 (Pre-AIA).

A patent’s specification satisfies the written description requirement when it “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Novartis Pharms. Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1016 (Fed. Cir. 2022) (“*Novartis*”) (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citations omitted) (“*Ariad*”)). In *Novartis*, the Federal Circuit held that

[64] In their Pre-Hearing Brief, Respondents argued that the PUR 1-Stage Filters anticipate claim 4. (RPBr. at 72 (claiming “The PUR 1-Stage Anticipates Claims 2-5” but providing no analysis with respect to claim 4); *see also* Tr. (Herman) at 1011:12-21 (opining on claims 1-5 and 23).). However, in their Post-Hearing Brief, Respondents did not allege that claim 4 is anticipated by the PUR 1-Stage Filters. (*See* RBr. at 32; Tr. (Herman) at 1082:1-19 (opining on only claim 3, not claim 4, for PUR 1-Stage); RDX-0007C.0042 (same).). Thus, any argument Respondents may try to make on this issue is waived under Ground Rule 10.1. Accordingly, with respect to the PUR 1-Stage Filters, only claims 2, 3, 5, and 23 are implicated.

the written description requirement was not met because the specification did not support that a "skilled artisan would understand a negative limitation to necessarily be present in [the] disclosure." *Novartis*, 38 F. 4th at 1020.

The written description analysis into whether there is "possession as shown in the disclosure" in the patent at issue is "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art." *Ariad*, 598 F.3d at 1351. The analysis varies depending on context. *Id*.

> [T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology. For generic claims, we have set forth a number of factors for evaluating the adequacy of the disclosure, including "the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science of technology, [and] the predictability of the aspect at issue"

Ariad, 598 F.3d at 1351 (citations omitted); *see also Juno Therapeutics, Inc. v. Kite Pharma, Inc.*, 10 F. 4th 1330, 1335 (Fed. Cir. 2021) ("What is required to meet the written description requirement 'varies with the nature and scope of the invention at issue, and with the scientific and technologic knowledge already in existence.'").

The written description requirement is separate from the enablement requirement. *Ariad*, 598 F.3d at 1344. In *Ariad*, the inventors had over "years of hard work, great skill and extraordinary creativity" discovered, named and described "previously unknown cellular components as a necessary predicate for their inventions" in a field of invention that was particularly unpredictable. *Id*. at 1354. The patent failed to meet the written description where it disclosed the use of three classes of molecules, but failed to sufficiently disclose molecules capable of the claimed function of reducing NF-eB activity. *Id*. at 1354-55.

Compliance with the written description requirement is a question of fact. *Id*. at 1354-55;

see also Enzo Biochem, Inc. v. Gen-Probe, Inc., 323 F.3d 956, 963 (Fed. Cir. 2002) ("*Enzo Biochem*") ("Compliance with the written description requirement is essentially a fact-based inquiry that will 'necessarily vary depending on the nature of the invention claimed.'" (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991) ("*Vas-Cath*"))).

The written description requirement does not require examples or an actual reduction to practice. *Ariad*, 598 F.3d at 1352. Filing of a patent application, i.e., a constructive reduction to practice, that "in a definite way identifies the claimed invention can satisfy the written description requirement." *Id*. The written description need not use the same words as the claimed invention, but a description that only renders the claimed invention obvious is also not adequate. *Id*.

Evidence of possession of the claimed invention may include "'disclosure of sufficiently detailed, relevant identifying characteristics . . . *i.e.,* complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics.'" *Enzo Biochem*, 323 F.3d at 954 (quoting and adopting PTO's standard for compliance with written description requirement; Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, 1, "Written Description" Requirement, 66 Fed. Reg. 1099, 1106 (Jan. 5, 2001) ("PTO Guidelines") (emphasis deleted)).

The written description requires a comparison between the claimed invention and the disclosure, as explained below in the PTO Guidelines.

> The analysis of whether the specification complies with the written description requirement calls for the examiner to ***compare the scope of the claim with the scope of the description*** to determine whether applicant has demonstrated possession of the claimed invention. Such a review is conducted from the standpoint of one of skill in the art at the time the application was filed and should include a determination of the field of the invention and the level of skill and

> knowledge in the art. Generally, there is an inverse correlation between the level of skill and knowledge in the art and the specificity of disclosure necessary to satisfy the written description requirement. Information which is well known in the art need not be described in detail in the specification.

(*See* PTO Guidelines, 66 Fed. Reg. at 1105 (citations omitted); Manual of Patent Examining Procedure § 2163(II)(A)(2) ("MPEP") (June 2020) (emphasis added); *see also Indivior UK Ltd. v. Dr. Reddy's Lab'ys S.A.*, 18 F.4th 1323, 1328 (Fed. Cir. 2021) ("*Invidior*") (describing that claims in a parent application can provide written description support for ranges in a child application); *Ariad*, 598 F.3d at 1351 ("the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed").

The purpose of the "written description" requirement is to "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession *of the invention*. The invention is, for purposes of the 'written description' inquiry, *whatever is now claimed*." *Vas-Cath*, 935 F.2d at 1563-64 (emphasis in original). In other words, the specification must describe the claimed invention.

> To comply with the written description requirement of **…** pre-AIA 35 U.S.C. 112, first paragraph, or to be entitled to an earlier priority date or filing date under … [35 U.S.C.] 120…, each claim limitation must be expressly, implicitly, or inherently supported in the originally filed disclosure. When an explicit limitation in a claim "is not present in the written description whose benefit is sought it must be shown that a person of ordinary skill would have understood, at the time the patent application was filed, that the description requires that limitation." *Hyatt v. Boone,* 146 F.3d 1348, 1353, 47 USPQ2d 1128, 1131 (Fed. Cir. 1998); see also ... *Yeda Research and Dev. Co. v. Abbott GMBH & Co.,* 837 F.3d 1341, 120 USPQ2d 1299 (Fed. Cir. 2016) ("Under the doctrine of inherent disclosure, when a specification describes an invention that has certain undisclosed yet inherent properties, that specification serves as adequate written description to support a subsequent patent application that explicitly recites the invention's inherent properties.") (citing *Kennecott Corp. v. Kyocera Int'l, Inc.,* 835 F.2d 1419, 1423 (Fed. Cir. 1987)).

(MPEP § 2163 II(A)(3)(b); *see also Novartis*, 38 F.4th at 1016 ("possession must be 'shown in the disclosure'").).

It is not enough that a claimed invention is 'an obvious variant of that which is disclosed in the specification.' Disclosure is essential; it is 'the *quid pro quo* of the right to exclude.'"

(citations omitted).); *Nuvo Pharms. (Ireland) Designated Activity Co. v. Dr. Reddy's Lab'ys Inc.*, 923 F.3d 1368, 1376-77 (Fed. Cir. 2019) ("*Nuvo*") ("The essence of the written description requirement is that a patent applicant, as part of the bargain with the public, must describe his or her invention so that the public will know what it is and that he or she has truly made the claimed invention.") (quoting *AbbVie Deutschland GmbH & Co. v. Janssen Biotech, Inc.*, 759 F.3d 1285, 1298 (Fed. Cir. 2014)).

A patent is presumed to have adequate written description. *Novartis*, 38 F.4th at 1019. Clear and convincing evidence overcomes the presumption of validity. *Ariad*, 598 F.3d at 1354.

2. Arguments

Respondents argued that the written description requirement is not met because the disclosure does not describe the full claim scope of: (a) filter media types that could fall within the broadly cited "filter media"; and (b) ranges of values of the FRAP factor and its variables recited in the asserted claims.

Respondents argued that the '141 patent and the inventors did not show that they had possession of filter species other than carbon block filters. (RSBr. at 12-29; RPBr. at 108-112.). Additionally, key issues are whether the content of claims 1, 2, 3, 4, 5, 6 and 23 are adequately disclosed in the specification of the '141 patent as of the filing date Brita sought (or at a later date that would satisfy black letter law.). Brita argued that there is adequate disclosure in the specification and originally filed claims for the asserted claims. (CPBr. at 112-13; CRBr. at 46; CSRBr. at 5-7.).[65] Brita argued that the written description inquiry is an objective inquiry into the specification. (CSRBr. at 5-6 (citing Tr. (Freeman) at 1501:11-1502:2, 1509:23-1511:22

[65] Respondents and Brita argued about written description support in the '372 application in their arguments about priority date. (*See* Section XII(A)(4), *supra* (discussing written description support in the '372 application).).

(explaining on a claim by claim basis where written support exists in the written disclosure of the ’141 patent specification); CPBr. at 113 (citing *Ariad*, 598 F.3d at 1351 (“requires an objective inquiry into the four corners of the specification.”).). Respondents argued that the broad ranges of the FRAP factor and input variables to the FRAP factor ranges recited in the asserted claims are unbounded and do not comply with the written description requirement. (RPBr. at 101-108; RSBr. at 29-38.).

In rebuttal, Brita argued that Respondents failed to consider the “four corners of the ’141 patent,” which provides express description in the specification and originally filed claims for the asserted claims. (CSRBr. at 5-7; CRBr. at 46; CPBr. at 112-13.). Brita also argued that Respondents seek a ‘heightened’ written description requirement that applicable black letter law does not require. Brita argued, correctly (and as a finding of fact) that the ’141 patent reasonably conveys that the inventors had possession of the claimed invention. (CPBr. at 112-13; CRBr. at 46; CSRBr. at 5-7.). Brita argued that there are sufficient and explicit disclosures that show that Brita had possession of the various filter type and the content of the claims, including the claimed ranges of FRAP factor values and FRAP factor variables when it filed the application for the ’141 patent. (CPBr. at 112-16; CRBr. at 47-48; CSRBr. at 9-16.).

The ’141 patent is presumed valid. Respondents have the burden to prove that the ’141 patent fails to comply with the written description requirement. *Ariad*, 598 F.3d at 1354. For the reasons detailed below, Respondents have failed to prove by clear and convincing evidence that the written description requirement is not met.

3. Explicit Description in the Specification

A specification that describes the claimed invention “in a definite way” satisfies the written description requirement. *Ariad*, 598 F.3d at 1352. Original claims are part of the

original specification and in many cases will satisfy the written description requirement. *Mentor Graphics Corp. v. EVE-USA, Inc.*, 851 F.3d 1275, 1297 (Fed. Cir. 2017) (citing *Ariad*, 598 F.3d at 1349; *ScriptPro LLC v. Innovation Assocs., Inc.*, 833 F.3d 1336, 1341 (Fed. Cir. 2016) ("*ScriptPro*") (explaining original claims can satisfy the written description requirement, but claims to a functionally defined genus require disclosure of species); *Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.*, 635 F.3d 1373, 1380 (Fed. Cir. 2011)).

The '141 patent was filed on September 9, 2008 as U.S. Application No. 12/207,284 ("the '284 application"). (JX-0022 at (21)-(22).).

Brita argued that Respondents did not dispute that explicit disclosure exists in the '284 application for the asserted claims. (CSRBr. at 5 (citing Tr. (Freeman) 1501:11-1511:22); CRBr. at 46.). However, Respondents contended that the full scope of the ranges of FRAP factors and filter types are not described. (RPBr. at 108-112; RSBr. at 12-29.). However, as discussed below, Respondents lacked credible support for any dispute that explicit disclosures of the claims, or the invention claimed does not exist. The findings of fact stem from Brita's more accurate and complete explanations of the explicit, detailed factual explanation for the written description of the invention that is reflected in the specification, and on the more thorough and credible explanations and opinions that Brita's expert, Dr. Benny Freeman offered during the Hearing

Dr. Freeman, Brita's expert, testified that the specification discloses all elements of the asserted claims, i.e., claims 1, 2, 3, 4, 5, 6, and 23 in the original claims as filed in the '284 application. (Tr. (Freeman) at 1508:4-14.). Dr. Freeman also testified that the specification of the '141 patent discloses all elements of the asserted claims at least in the testimony to which citations are given in Chart No. 12, below. In the cited testimony below, Dr. Freeman was

unequivocal in citing to the locations in the '141 patent where specific disclosures of the claims are made.

Chart No. 12: Written Description Support for the Claimed Invention Taken From Dr. Freeman's Testimony

Asserted Claims	Written Description Support in the '141 patent (JX-0022 at column: line number)	Dr. Freeman's Testimony (Tr. (Freeman) Page:line number)
1. A gravity-fed water filter, comprising: … [claim 1 verbatim in its entirety]	12:9-28	1501:13-1502:2
2. The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200.	6:51-52	1509:20-1510:4
3. The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3.	25:37-40	1510:7-17
4. The water filter as recited in claim 3, wherein the volume of the filter media (V) is less than about 150 cm^3.	25:37-40	1510:7-17
5. The water filter as recited in claim 5, wherein the average filtration unit time (f) is less than about 12 minutes per liter.	25:42-45	1510:19-1511:6
6. The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 6 minutes per liter.	25:42-45	1510:19-1511:6
23. A gravity-flow system for filtering water, comprising: … [claim 23 verbatim in its the entirety]	12:41-52; Figure 1	1511:8-22
Types of filters		
Granular, loose media	13:31-34 "While the discussion will tend to focus on block filters, it should be understood that the various materials may	1513:16-20

	be used in granular or "loose media" type filters, according to various embodiments of the present invention."	
Mixed media, carbon blocks, nonwovens, hollow fibers, and other filtration formats	25:9-12 "The nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed media, carbon blocks, nonwovens, hollow fibers, and other filtration formats."	1512:21-1513:1
Membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands	26:30-37 "Other embodiments of the present invention include alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc."	1513:2-6

(JX-0022 at 6:51-52, 12:9-28, 13:31-34, 25:9-12, 37-45, 26:30-37; Tr. (Freeman) at 1501:13-1502:2, 1509:20-1510:4, 1510:7-1511:22, 1512:21-1513:6, 1513:16-20.).

Dr. Freeman thus compared verbatim on a claim-by-claim basis, as black letter law suggests is required, that the original claims in the '284 application mirror the asserted claims of the '141 patent, and that the specification provides the explicit basis for the asserted claims. *See Ariad*, 598 F.3d at 1349.

As Dr. Freeman testified, not only is there explicit support in the disclosure for each of

the asserted claims, but also there are working examples of the filters that Dr. Knipmeyer tested.[66] In this case, the working examples that Dr. Knipmeyer tested and recorded in her Notebooks are described in the '141 patent as "gravity fed carbon blocks [that] have been formulated in cylindrical multiple-core blocks" and appear in Table 9, below. (JX-0022 at 27:50-53, Table 1; *see also* Section XII(A)(2)(b), *supra* (Reduction to Practice of the PA3-8 Water Filter).). Dr. Freeman testified and noted that Table 1 of the specification of the '141 patent provides examples of filters with lead sorbent and activated carbon that Dr. Knipmeyer made and tested. (Tr. (Freeman) at 1541:8-11 (describing the PA3-8 as a working example in the '141 patent), 1571:7-12 (acknowledging all working examples in the '141 patent are for carbon block filters).). Examples of "Filter Multiple Core" or carbon block water filters are listed in Table 1 of the '141 patent, reproduced in Table 9, below.

[66] Patent specifications may include working examples or prophetic examples. "A working example is based on work actually performed. A prophetic example describes an embodiment of the invention based on predicted results rather than work actually conducted or results actually achieved." MPEP, § 2164.02. In this case, the working examples are listed in Table 5 and include the PA3, PT3, P2 and cylindrical block formulations (PA3-5, PA3-8, PT3-4, PT3-6, PT3-4 alternate housing, PT3-11, PT3-13, PT3-51, PT3-53, P2-8 lead sorbent free (unclaimed embodiment), P2-6 lead sorbent free (unclaimed embodiment), Block 1, Block 2). (JX-0022 at Table 5.).

Table No. 9: Written Description Support for the Claimed Invention at Table 1 of the '141 Patent

TABLE 1

Filter Multiple Core (FIGS. 10A-F):	Lead Sorbent Type	Carbon Type	% Lead Sorbent	% Carbon	% Binder	Fill Weight
PA3-5	Alusil ™ [1]	PAC [2]	20	40	40	36.5
PA3-8	Alusil	PAC	20	40	40	36.0
PT3-4	ATS [3]	PAC	20	40	40	39.5
PT3-6	ATS	PAC	20	40	40	39.5
PT3-5 alternate housing	ATS	PAC	20	40	40	39.5
PT3-11	ATS	PAC	20	40	40	40.0
PT3-13	ATS	PAC	20	40	40	40.0
PT3-51	ATS	PAC	20	40	40	40.0
PT3-53	ATS	PAC	20	40	40	40.0
P2-8	N/A	PAC	0	60	40	40.0
P2-6	N/A	PAC	0	60	40	40.0

[1] Alusil - Selecto Scientific, Inc., 3980 Lakefield Court, Suwanee, GA 30024 Sodium Alumina silicate lead sorbent with diameter 40-70 μm.
[2] PAC - powder activated carbon with size 80 × 325 mesh.
[3] ATS Engelhard corporation 101 Wood Ave. Iselin, NJ 08830 Titanium Silicate zeolite lead sorbent with 25-30 μm diameter.

(JX-0022 at Table 1.).[67]

Similarly, Dr. Freeman testified that Table 5 of the '141 patent, shown below in Table No. 10, identifies the FRAP values for the working examples of the carbon block filters that meet the asserted claim 1 limitation of a FRAP factor value of less than 350, as listed in the far right column. (Tr. (Freeman) at 1503:5-10; Tr. (Gary Hatch) at 1412:17-1414:1 (describing Table 5 as including all working examples of the '141 patent, but noting P2-8 and P2-6 do not have lead

[67] Table 1 and Table 5 lists three formulations of water filters: PA3, PT3 and P2. (JX-0022 at 16-21.). They are cylindrical multiple-core blocks ("CMC" blocks) made of activated carbon in powder or fiber form, binder and lead sorbent/lead scavenger. (*Id*. at 27:51-57.). Table l lists the types of activated carbon and lead sorbent, and their content in the different formulations. A lead sorbent is a lead scavenger. (JX-0022 at 15:39-40.).

sorbent, and therefore do not meet the requirement of claim 1 that the filter media includes lead scavenger).).[68] Table 5 of the '141 patent, shown below, clearly identifies at the top of each column each of the individual FRAP factor variables of filter usage lifetime **L** (gallons), average filtration unit time over lifetime **f** (min/liter), volume of filter media **V**, effluent lead concentration at end of lifetime $\mathbf{c_e}$ (mg/liter), and the FRAP Factor for each water filter that was tested.

[68] At the time that Dr. Gary Hatch testified on October 13, 2022, he held a bachelor's and master's degrees in chemistry from Emporia State University in Emporia, Kansas, and a PhD in analytical and organic chemistry from Kansas State University. (Tr. (Hatch) at 1401:15-19.). He worked on water filtration for 49 years and advises on point-of-use, point-of-entry water treatment through his firm, "Hatch Global Consulting Services." (*Id*. at 1401:21-22, 1399:11-19.). Since the 1980's, Dr. Hatch sat on and chaired NSF task groups to improve drinking water treatment, and wrote the first protocol that led to the 2007 NSF 53 standard. (*Id.* at 1403:15-1404:8.). Dr. Hatch was accepted as an expert in the fields of water filtration, lead removal from water, and the subject matter that the '141 patent is directed. (*Id*. at 1405:23-1406:7.). Based on his education and experience, Mr. Herman qualified as an expert under Rule 703 of the Federal Rules of Evidence ("FRE").

Table No. 10: Written Description Support for the Claimed Invention at Table 5 of the '141 Patent

Table 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	[[58.6]]48.6
PA3-8	40	4.4	89	7.5	[[45.7]]36.7
PT3-4	40	4.2	89	6.3	[[38.7]]29.4
PT3-6	40	4.6	89	13.3	[[78.5]]68.1
PT3-4 alternate housing	40	4.6	89	1.3	[[16.6]]6.7
PT3-11	40	4.4	89	8.5	[[51.2]]41.6
PT3-13	40	4.2	89	9.2	[[52.7]]43.0
PT3-51	40	5.7	89	3.8	[[36.2]]24.1
PT3-53	40	5.1	89	2.3	[[24.2]]13.0
P2-8 lead sorbent free	40	3.4	89	52.8	[[208.4]]199.7
P2-6 lead sorbent free	40	2.3	89	87.1	[[223.1]]222.9
Cylindrical Block:					
Block 1	40	17.0	151	9.2	[[357.7]]295.2
Block 2	40	9.9	151	14.6	[[308.2]]272.8
Mixed Media:					
Brita Granular	40	5.5	128	42.2	[[386.7]]371.4
German Maxtra	40	4.9	145	43.8	[[402.3]]389.0
Pur 2 stage w/ timer	40	16.0	141	30.2	[[911.4]]851.6
Pur 2 stage w/ timer	40	10.4	141	36.6	[[706.8]]670.9
Pur 2 stage w/ timer	40	11.0	141	38.6	[[785.9]]748.4

(JX-0022 at Table 5 (ann. in '141 patent's Certificate of Correction).).

The working examples that Dr. Freeman identified can be found in Table 5, and again, are examples of filters that Dr. Knipmeyer tested for purposes of the '284 application and the '191 patent In support of his testimony, Dr. Freeman prepared a demonstrative, CDX-002.14, reproduced below at Table No. 11, in which he highlighted in green those water filters from Table 5 that meet the asserted claim 1 limitation of a FRAP factor under 350, which are the PA3-

5, PA3-8, PT3-4, PT3-4 alternate housing, PT3-11, PT3-13, PT3-51, PT3-53, and Block 1 water filters. (Tr. (Freeman) at 1503:3-13; CDX-0002.14.).

Table No. 11: Working Examples in Table 5 of the '141 Patent

Table 5 reports many working examples of filters that achieve FRAP below 350

TABLE 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	58.6
PA3-8	40	4.4	89	7.5	45.7
PT3-4	40	4.2	89	6.3	38.7
PT3-6	40	4.6	89	13.3	78.5
PT3-4 alternate housing	40	4.6	89	1.3	16.6
PT3-11	40	4.4	89	8.5	51.2
PT3-13	40	4.2	89	9.2	52.7
PT3-51	40	5.7	89	3.8	36.2
PT3-53	40	5.1	89	2.3	24.2
P2-8 lead sorbent free	40	3.4	89	52.8	208.4
P2-6 lead sorbent free	40	2.3	89	87.1	223.1
Cylindrical Block:					
Block 1	40	17.0	151	9.2	357.7
Block 2	40	9.9	151	14.6	308.2
Mixed Media:					
Brita Granular	40	5.5	128	42.2	386.7
German Maxtra	40	4.9	145	43.8	402.3
Pur 2 stage w/timer	40	16.0	141	30.2	911.4
Pur 2 stage w/timer	40	10.4	141	36.6	706.8
Pur 2 stage w/timer	40	11.0	141	38.6	785.9

Filter	FRAP	C_e (μg/liter)
PT3-4 alternate housing	6.7	1.3
PT3-53	13	2.3
PT3-51	24.1	3.8
PT3-4	29.4	6.3
PA3-8	36.7	7.5
PT3-11	41.6	8.5
PT3-13	43	9.2
PA3-5	48.6	9.5
Block 1	295.2	9.2
Brita Granular	371.4	42.2
German Maxtra	389	43.8
Pur 2	670.9	36.6
Pur 2	748.4	38.6
Pur 2	851.6	30.2

JX-0022 at Table 5 CDX-0002.14

(CDX-0002.14 (displaying Table 5 from the '141 patent and particular filter formulations that have FRAP factor values below 350 (highlighted in green) and values over 350 (highlighted in orange).).

Dr. Freeman also highlighted in Table No. 11, above, in orange, the prior art, conventional water filters that did not meet the FRAP factor values required by asserted claim 1, which are the Brita Granular, German Maxtra, and PUR 2 water filters. (Chart No. 15, *supra*; Tr. (Freeman) at 1503:11-13.).

In contrast, Dr. Hatch testified that he did not compare the originally filed claims of the '284 application against the claims of the '141 patent, as applicable black letter law requires, as follows:

Q. …let's go back and compare the originally filed claims with the issued claims.

Did you consider that as part of your opinion for written description?

A. I don't recall that I was able to relate that to the - - relate those, as you say.

Q. Okay. So is it fair to say you did not consider the originally filed claims when forming your opinion on written description?

A. I can't recall that I did. I don't know.

(Tr. (Hatch) at 1448:5-14; *see also* Tr. (Hatch) at 1448:15-1453:6 (comparing original claims as filed in the '284 application with the issued claims of the '141 patent); *compare* CDX-0002.19 (JX-0023.0112-15 (original claims 1-6 and 23)) *with* JX-0022 at cls. 1-6 and 23).).

In other words, while Dr. Hatch initially claimed that he had formed an opinion on the written description requirement. he later acknowledged that he had not. (*Compare* (Tr. (Hatch) at 1410:9-21 (forming an opinion) *with* Tr. (Hatch) at 1448:5-14 (not forming an opinion).). Dr. Hatch cannot have formed an opinion on the written description requirement, because he contradicted himself a number of times and conceded that he had not followed black letter law each time he was asked whether he had compared the claims in the '284 application with the claims of the '141 patent and each time he answered that he had not done so.[69] In other words, Dr. Hatch's initial "opinion" was both legally and factually erroneous. It was not credible. By his own later testimony, Dr. Hatch acknowledged that he did not consider the language or the content of the originally filed claims or compare them against the filed claims of the '141 patent to show what the inventors had possession of when they filed the original application and how

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[69] Dr. Hatch acknowledged during his direct examination that he had formed an opinion only with respect to carbon block filters. (Tr. (Hatch) at 1410:16-21 (opining that "the inventors did not possess all of the claimed types of filters"); 1425:17-23 (describing that only working examples of carbon block filters are present, but not other types of filters).). Dr. Hatch then proceeded to essentially acknowledge through claim by claim examination on cross-examination that his testimony did not comport with the evidence for written description consistent with case precedent. (Tr. (Hatch) at 1448:15-1453:6 (comparing original claims as filed in the '284 application with the issued claims of the '141 patent).).

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that traced through to the '141 patent that issued.[70] *Invidior*, 18 F.4th at 1328 (stating that express recitation of claim limitation in original claims of a child application can be written description support). On redirect examination, Dr. Hatch answered affirmatively when asked whether he had considered the entirety of the '141 patent when he formed his opinion. (Tr. (Hatch) at 1475:10-12.). However, on cross-examination, Dr. Hatch contradicted himself and undermined his own testimony when he admitted that written description support does exist in the original claims of the '284 application and in the specification of the '141 patent, for each claim limitation as is detailed in Chart No. 13 below. It should be noted that each claim limitation is recited under the column labeled "Asserted Claims." The remainder of Chart No. 16 is self-explanatory and merely cites where Dr. Hatch's testimony can be found in the Hearing transcript.

Chart No. 13: Written Description Support for the Claimed Invention in the '284 Application and in the '141 Patent

Asserted Claims	Written Description Support in the '284 Application (JX-0023.0112-15)	Dr. Hatch's Testimony (Tr. (Hatch) Page: line number)
1. A gravity-fed water filter, comprising:	At claim 1 (verbatim the same as asserted claim 1 preamble)	1449:7-12; 1450:21-23
filter media including at least activated carbon and a lead scavenger,	At claim 1 (verbatim the same as asserted claim 1 filter media limitation)	1449:13-16
wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:	At claim 1 (verbatim the same as asserted claim 1 wherein clause)	1449:17-22

[70] Dr. Hatch's failure to consider the originally filed claims, and his subsequent admission during testimony that the originally filed claims in the '284 application contain the language of the claims as filed in the '141 patent is a party admission that the originally filed claims provide written description support for the asserted claims.

$$\text{FRAP} = \frac{[V * f * c\_e]}{[L * 2]}$$		
where:		
V = volume of the filter media (cm^3),	At claim 1 (verbatim the same as asserted claim 1 volume limitation)	1449:23-1450:5
f = average filtration unit time over lifetime L (min/liter),	At claim 1 (verbatim the same as asserted claim 1 filtration limitation)	1450:6-11
c_e = effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter, and	At claim 1 (verbatim the same as asserted claim 1 lead concentration limitation)	1450:12-15
L = filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).	At claim 1 (verbatim the same as asserted claim 1 lifetime limitation)	1450:16-20
2. The water filter as recited in claim 1, wherein the filter achieves a FRAP factor of less than about 200.	At claim 2 (verbatim the same as asserted claim 2)	1451:9-12
3. The water filter as recited in claim 1, wherein the volume of the filter media (V) is less than about 300 cm^3.	At claim 3 (verbatim the same as asserted claim 3)	1451:13-16
4. The water filter as recited in claim 3, wherein the volume of the filter media (V) is less than about 150 cm^3.	At claim 4 (verbatim the same as asserted claim 4)	1451:17-19
5. The water filter as recited in claim 5, wherein the average filtration unit time (f) is less than about 12 minutes per liter.	At claim 5 (verbatim the same as asserted claim 5)	1451:20-22
6. The water filter as recited in claim 1, wherein the average filtration unit time (f) is less than about 6 minutes per liter.	At claim 6 (verbatim the same as asserted claim 6)	1451:23-24

23. A gravity-flow system for filtering water, comprising: a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water;	At claim 23 (verbatim the same as asserted claim 23 preamble and container limitation)	1452:8-17; 1453:4-6
a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir; and a filter as recited in claim 1 disposed within the cartridge.	At claim 23 (verbatim the same as asserted claim 23 cartridge limitation and filter limitation)	1452:20-1453:3

(JX-0023.0112-13 (original claims 1-6, 23); Tr. (Hatch) at 1449:7-1450:23, 1451:13-24, 1452:8-1453:6; *compare* CDX-0002.19 (JX-0023.0112-15 (original claims 1-6 and 23)) *with* JX-0022 at cls. 1-6 and 23).).

Through systematic questioning by Brita's attorney, and by his own systematic responses, Dr. Hatch ultimately acknowledged that the asserted claims of the '141 patent mirror the claims as originally filed in the '284 application. Even without Dr. Freeman's testimony, and only through careful cross-examination, Dr. Hatch undermined Respondents' argument that they had "clear and convincing" evidence that the written description requirement was not fulfilled.[71] The cited Hatch testimony, almost without more, supports a finding that Respondents did not prove by clear and convincing evidence that the '141 specification does not provide written description support for the'141 patent and the claimed invention. Nonetheless, Dr. Freeman's testify persuasively and credibly confirmed that the '141 specification provides written

[71] After the Hatch and Freeman testimonies, it should have been clear to Respondents that their written description arguments were unsupported by either documentary or testamentary evidence.

description support for the '141 patent as does the '284 application. (*See supra*.). However, problems with Respondents' arguments and testimony do not end with that cited portion of Dr. Hatch's testimony.

4. Filter Species Other Than Carbon Block and Boilerplate Language in the Specification

Respondents argued that the '141 patent does not reflect that the inventors had possession of a broad range of filter media types. Respondents also argued about boilerplate language in the specification. These arguments are related, and addressed by the following analysis of what the evidence supports that the specification reasonably conveys to a person skilled in the art.

a) Filter Species Other Than Carbon Block

Respondents argued that the '141 patent does not show that the inventors had possession of a filter species other than the carbon block filters. (RPBr. at 111; RSBr. at 12-16, 17-20.). Respondents contended that the '141 patent is directed to a genus of at least eight distinct types of filter media, but the specification only possessed a limited number of carbon block water filters.[72] [73] (RSBr. at 21-23 (citing *Ariad*, 598 F.3d at 1350 (other citations omitted); RPBr. at

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[72] A genus is a group of structurally related materials, for example, structurally related chemicals. *In re Kalm*, 378 F.2d 959, 963 (C.C.P.A. 1967) (describing a genus as a "group of compounds closely related both in structure and in properties"). Brita did not present evidence on a genus/species theory because Respondents' motion to strike genus/species arguments was granted. (*See* Section II(A), *supra*.).

[73] Respondents contended that this Investigation is similar to another investigation, where claims to a genus of coated optical fibers were invalid for lack of adequate written description support. (RSBr. at 22 (citing *Certain UV Curable Coatings For Optical Fibers, Coated Optical Fibers, and Products Containing the Same*, Inv. No. 337-TA-1031, Comm'n Op. at 24 (June 7, 2018) ("*Certain UV Curable Coatings*") (holding claims invalid for lack of written description support for broad claims with limited written disclosure in a context of unpredictability in attaining claimed property limitations).). However, *Certain UV Curable Coatings* is distinguishable because the lack of adequate written description resulted from the claiming of many classes of generic materials together with the finding of unpredictability. *Id*. Unlike in *Certain UV Curable Coatings*, the '141 patent identifies a limited number of species in the written description, and Dr. Freeman testified that each of the species has been well studied and known before the '141 patent. (*See* Sections XII(C)(4)(e)(i), (ii) and XII(D)(2)(e), *infra*.). Therefore, *Certain UV Curable Coatings* does not support that the written description requirement is not met.

109.).

In rebuttal, Brita contended that Respondents argued for a heightened written description requirement for every potential species within the scope of the claims that is not required at law. (CRBr. at 46; CSRBr. at 5.). Brita noted that the written description requirement test is whether the disclosure "reasonably conveys" to those skilled in the art that the inventor possessed the claimed subject matter, and does not require actual reduction to practice. (CPBr. at 111-12; CRBr. at 46 (citing *Ariad*, 598 F.3d at 1351); CSRBr. at 4.). Brita argued that the specification discloses numerous filters, accompanied by examples of flow rate, volume, lifetime, effluent lead concentration, and FRAP factors that embody the claimed invention. (CPBr. at 115-19; CSRBr. at 6 (citing JX0022 at Table 5).).

In *Ariad*, the Federal Circuit explained that a description of a genus requires disclosure of a representative number of species within the genus.

> [The Federal Circuit] held that a sufficient description of a genus instead requires the ***disclosure*** of either a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can ***"visualize or recognize" the members of the genus***. We explained that an adequate written description ***requires a precise definition, such as by structure, formula, chemical name, physical properties, or other properties***, of species falling within the genus sufficient to distinguish the genus from other materials.

Ariad, 598 F.3d at 1350 (citations omitted, emphasis added).

Respondents argued that another investigation, *Certain LED Products*, is also relevant here. (RSBr. at 27 (citing *Certain Light-Emitting Diode Products, Fixtures, and Components Thereof*, Inv. No. 337-TA-1213, Initial Determination at 41 (Aug. 17, 2021) ("*Certain LED Products*") (finding lack of written description for a genus of devices with efficiencies above 85 LPW).). In *Certain LED Products*, the patent at issue had "no indication that the inventors thought their approach involved any approach other than BSY+R." *Id*. Unlike in *Certain LED Products*, the '141 patent explicitly contemplates other embodiments of filter types, not that the invention was limited to carbon-block technology. (Tr. (Freeman) at 1512:2-1513:6; JX-0022 at 13:30-34, 25:5-12, 26:30-37.). Thus, *Certain LED Products* is distinguishable. The fact that the disclosures in the '141 patent meet the written description requirement is not undermined by the cited cases.

Asserted claim 1 recites "filter media" without limiting the type of filter media, and thus is a generic term. Even Respondents' expert, Dr. Hatch, whose testimony was often self-contradictory, acknowledged generally that the term "filter media" was generic. (*See* Tr. (Hatch) 1453:14-1454:13 (acknowledging that the claims do not cite filter media types); RSBr. at 21-22 (arguing Brita fails to provide sufficient description for a genus of filter types (citing *Ariad*, 598 F.3d at 1350 (other citations omitted).). Dr. Freeman also generally acknowledged generic "filter media" as classes of filter media. (Tr. (Freeman) at 1489:12-18.). According to the '141 patent specification, the species of filter media include mixed media, carbon blocks, nonwovens, hollow fibers, membranes, depth media, nanoparticles and nanofibers, and ligands. (JX-0022 at 25:9-12 ("The nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed media, carbon blocks, nonwovens, hollow fibers, and other filtration formats."); 26:30-37 ("Other embodiments of the present invention include alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc.").).

Respondents recognized that the "at least eight types of filter media" have been explicitly disclosed in the specification. (*See* Chart No. 12, *supra* (listing explicit disclosure of filter media types in the specification).). As explained in *Ariad*, one way to define species falling within a genus is by name. Here, the specification of the '141 patent identifies by name the species such as mixed media, carbon blocks, nonwovens, hollow fibers, membranes, nonwovens, depth media, nanoparticles and nanofibers, and ligands, in at least two (2) locations: at column 25, lines 9-12, and column 26, lines 30-37. (JX-0022 at 25:9-12, 26:30-37.). In other words, a skilled artisan would be able to "visualize or recognize" the members of the genus because the specification clearly identifies the species.

Respondents argued that the asserted claims purport to cover any activated carbon and any lead scavenger, which together with the filter media types can cover tens of thousands of combinations of filter types. (RPBr. at 108; RSBr. at 13.). In rebuttal, Brita argued that the specification discloses working examples with activated carbon and lead scavengers, and "also disclosed additional activated carbon and lead scavengers that could be used beyond those found in the working examples." (CSRBr. at 12 (citing JX-0022 at 13:34-14:4 (describing sources and types of activated carbon such as derived from "coal, or from pitch, bones, nut shells, coconut shells, corn husks, polyacrylonitrile (PAN) polymers, charred cellulosic fibers, . . . wood, and the like"), 15:39-45 (listing lead scavengers such as "metal ion exchange zeolite sorbents, . . . , aluminosilicates, . . . zirconia oxides and hydroxides.")).

Brita argued that activated carbon is well-known. (CSRBr. at 12 (citing Tr. (Hatch) at 1462:2-13 (acknowledging activated carbon is well-known), Tr. (Freeman) at 1527:16-19 (describing activated carbon and lead scavenger as known materials for water filters).).

For the reasons described above, the filter media, activated carbon and lead scavenger were known in the art. There appears to be no dispute that "filter media" is a generic term that encompasses known species.

b) Working Examples Other Than Carbon-Block Filter Media

Respondents argued that the only working examples in the '141 patent (see Tables 1 and 5 of the '141 patent) are for carbon block filters. (RPBr. at 108, 100; RBr. at 76; RSBr. at 13, 23.). In rebuttal, Brita argued correctly legally that the written description requirement does not require working examples of each species. (CPBr. at 116 (citing *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003) ("*Cordis*") ("A specification may, within the meaning of 35 U.S.C 112 para. 1, contain a written description of a broadly claimed invention

without describing all species that [the] claim encompasses."); CSRBr. at 9-11.). In *Cordis*, a description of a preferred embodiment of certain types of openings was sufficient written description of broadly claimed openings. *Cordis*, 339 F.3d at 1364-65.

The holding in *Cordis* supports a factual finding that while the '141 patent describes a preferred embodiment of carbon block, the other broadly claimed filters, identified below and in the '141 patent, have adequate written description in the specification. (JX-0022 at 11:35-41 (describing carbon block water filters), Table 5 (working examples of carbon block filters).).

Brita also argued that "a constructive reduction to practice may be sufficient if it identifies the claimed invention and does so in a definite way." (CSRBr. at 9 (citing *Centrak, Inc. v. Sonitor Techs., Inc.*, 915 F.3d 1360, 1367 (Fed. Cir. 2019) ("*Centrak*")).). In *Centrak*, the Federal Circuit explained that "written description is about whether the skilled reader of the patent disclosure can recognize that what was claimed corresponds to what was described; it is not about whether the patentee has proven to the skilled reader that the invention works, or how to make it work, which is an enablement issue." *Centrak*, 915 F.3d at 1366 (quoting *Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1191 (Fed. Cir. 2014)).

In *Centrak*, a specification that described, in bulk, infrared technology, but mentioned ultrasound, was an insufficient basis for generic claim language to fail the written description requirement. *Centrak*, 915 F.3d at 1366-67. The Federal Circuit noted that, within the context of the invention, infrared and ultrasonic technologies were interchangeable. *Id*. at 1368. While the inventor admitted that he had not created the ultrasound embodiment, details of how to create that embodiment could have been within the scope of a skilled artisan. *Id*. at 1369. Constructive reduction to practice might suffice to show written description, and as in *Ariad*, "the level of detail required to satisfy the written description requirement varies depending on the nature and

scope of the claims and on the complexity and predictability of the relevant technology." *Centrak*, 915 F.3d at 1367 (quoting *Ariad*, 598 F.3d at 1351).

Brita argued that the '141 patent identifies the claimed invention in a definite way when it describes that "[t]he nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mix-media, carbon blocks, non-wovens, hollow fibers, and other filtration formats." (CSRBr. at 9-10 (citing JX-0022 at 25:9-12; Tr. (Freeman) at 1515:6-14 (explaining that FRAP factor and its variables are impacted by structure and "structure elements …could be deployed in alternate formats …to obtain good performance.").). Dr. Freeman testified that "common structural, chemical, or design features" of activated carbon, lead scavenger are limited to a FRAP factor of less than 350, and the structural elements of activated carbon and lead scavenger "could be deployed in alternate formats." (Tr. (Freeman) at 1514:10-1515:14.). Dr. Freeman's statement is supported, as discussed below in XII(C)(4)(e), by "the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science of technology, [and] the predictability of the aspect at issue." *Ariad*, 598 F.3d at 1351.

For the reasons described below, it is a finding of fact, supported by substantial evidence, that the nature and context of the invention supports that the written description requirement is met. (*See* Section XII(C)(4)(e), below.).

c) ***In Ipsis Verbis*** or Boilerplate Language in the Specification

Respondents contended that the appearance of claim language *in ipsis verbis* or as "boilerplate reservation of rights for other embodiments" does not meet the written description

requirement.[74] (RSBr. at 24-25 (citing *Nuvo*, 923 F.3d at 1374).). In *Nuvo*, the Federal Circuit held that a description of typical dosage amounts, without discussion or explanation of the efficacy of those amounts, did not adequately describe an efficacy limitation. *Id*. at 1380. A description that taught that a certain limitation might work was not sufficient description, despite what a skilled artisan would have thought about its efficacy. *Id*. at 1381. *Nuvo* was distinguished in *BASF Plant Sci., LP v. Commonwealth Sci. & Indus. Rsch. Organisation*, 28 F.4th 1247, 1266 (Fed. Cir. 2022) ("*BASF*"). In *BASF*, the presence of working examples and testimony about what a person of ordinary skill in the art would have understood from the disclosure supported that the written description requirement was met. *Id*.

In rebuttal to Respondents, Brita argued that the written description inquiry is an "objective inquiry into the four corners of the specification." (CSRBr. at 5.); *Ariad*, 598 F.3d at 1351. In other words, all of the content of the specification must be considered. Brita argued, also correctly, that "the '141 patent discloses other embodiments and makes clear that the invention is *not* limited to [the carbon block] embodiment." (CSRBr. at 6 (citing JX-0022 at 13:30-34, 25:5-12); CPBr. at 48; *see also* Chart No. 12, *supra* (detailing disclosure of other embodiments).).

Chart No. 12 above lists the embodiments other than a carbon block embodiment that the '141 patent describes: i.e., at column 13, lines 31-34, the embodiment of granular, loose media is described rather as opposed to carbon block filters; at column 25, lines 9-12, the '141 patent describes that the FRAP factor applies to other embodiments of mixed media, nonwovens, and hollow fibers as well as carbon blocks; and at column 26, lines 30-37, the '141 patent describes

[74] Respondents' argument about the appearance of claim language *in ipsis verbis* in the specification is a party admission that there is literal antecedent basis for the asserted claims in the specification.

that the FRAP factor criteria applies to other embodiments such as membranes, nonwovens, depth media, nanoparticles and nanofibers, and ligands. These embodiments of carbon block, granular loose media, mixed media, nonwovens, hollow fibers, membranes, depth media, nanoparticles and nanofibers and ligands are all included in the generic term "filter media" of the asserted claims. Dr. Hatch admitted, again a party admission, that the '141 patent describes various embodiments including mixed-media, carbon blocks, nonwovens, hollow fibers, and granular or loose media. (Tr. (Hatch) at 1454:21-1457:23.).

Brita also counter-argued that Respondents failed to acknowledge the "existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science of technology, [and] the predictability of the aspect at issue." (CSRBr. at 7 (citing *Ariad*, 598 F.3d at 1351).). The existing knowledge, extent and content of the prior art, maturity of the science and technology, and predictability are discussed more fully below in sections v, vi, and vii.

For the reasons described below, the nature and context of the invention support adequate written description. (*See* Section XII(C)(4)(e), *infra*.).

d) A Person of Ordinary Skill

The test for written description is "from the perspective of a person of ordinary skill in the art." *Novartis*, 38 F. 4th at 1020. The analysis varies depending on context. *Ariad*, 598 F.3d at 1351.

> [T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology. For generic claims, we have set forth a number of factors for evaluating the adequacy of the disclosure, including "the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science of technology, [and] the predictability of the aspect at issue."

Ariad, 598 F.3d at 1351 (citations omitted); *see also Juno Therapeutics, Inc. v. Kite Pharma, Inc.*, 10 F. 4th 1330, 1335 (Fed. Cir. 2021).

In this Investigation, Dr. Knipmeyer, Brita's expert, Dr. Freeman, and Respondents' expert, Dr. Hatch, all qualified as persons of ordinary skill in the art at the time of the invention. (Tr. (Freeman) at 1488:11-14; Tr. (Hatch) at 1405:7-10; Section VII(B) (Definition of a Person of Ordinary Skill in the Art)).

e) The Written Description Reasonably Conveys Possession

Adequate written disclosure is present when the specification "reasonably conveys" to a person of ordinary skill in the art that the inventors had possession of the claimed invention. *Novartis*, 38 F.4th at 1016. In *Ariad*, the Federal Circuit recognized that the "adequacy" of a disclosure depends on the nature and scope of the claims, and on the complexity and predictability in the art. The Federal Circuit set forth factors to determine "adequacy" of a disclosure when a patent claims an invention generically. *Ariad*, 598 F.3d at 1351.

In this Investigation, asserted claim 1 cites "filter media" generically, without limiting the type of filter media. (*See* Tr. (Hatch) 1453:14-1454:13; Tr. (Freeman) at 1489:12-18.). Accordingly, the written description analysis below considers the *Ariad* factors as they apply to the '141 patent: (a) the existing knowledge in the field of water filtration and filter types, (b) the extent and content of the prior art of water filtration and filter types, (c) the maturity of the science of water filtration, and (d) the predictability of filter media in gravity-fed water filters. *Ariad*, 598 F.3d at 1351. An evaluation of these factors supports a factual finding that the '141 patent provides adequate written description for the asserted claims.

i. Existing Knowledge in the Field of Water Filtration

Respondents' Accused Products, the PUR Plus Mario 2 Filter, PUR Plus Mario 3 Filter, ZeroWater Replaced Filters, and LifeStraw Home Full Replacement Filter, comprise materials

other than carbon block, i.e., mixed media, nonwoven, membrane and nanofiber filter technology, which Respondents argued are "entirely different in form and function" from carbon block technology. (RSBr. at 20 (citing Tr. (Nishijima) at 404:7-405:13 (describing LifeStraw products with a hollow fiber module); Tr. (Rockstraw) at 472:22-474:7 (describing PUR Plus filters with mixed media of activated carbon and ion exchange resin)[75], 486:24-487:11 (describing ZeroWater filters with mixed media of activated carbon and ion exchange resin), 592:19-593:2 (describing LifeStraw filter with a first stage membrane microfilter); Tr. (Hill) at 936:1-939:5 (describing LifeStraw filters with stage 1 membrane microfilter and s stage two microfiber filter); Tr. (Mitchell) at 764:11-19 (describing PUR Plus Mario 2 & 3 filters with a pleat pack); RPBr. at 108; RDX-0001.0020.).

The DI Products, Brita LongLast Products and LongLast+ Products, consist of activated carbon within a pleated filter cartridge. (*See* section XI(B)(2) (DI Products Practice Claim 1, filter media limitation).). The '141 patent itself describes "mixed media filters containing granular carbon and ion exchange resin" that were tested included "the BRITA® gravity-flow mixed media filter, the BRITA® Germany MAXTRA® gravity-flow mixed media filter, and the Proctor and Gamble PUR® 2-stage gravity-flow filter with pleated microfilter." (JX-0022 at 31:7-15.). The existing art prior to the '141 patent consisted of mixed media filters, as demonstrated by the prior art filters that failed the FRAP limitation and are listed in Table 5. (*See* Chart No. 15, *supra* (Working Examples in Table 5 of the '141 Patent).).

Brita argued that carbon block filters are not different in form and function than other filter media types because they function in the same manner across filter media types. (CSRBr.

[75] Dr. Knipmeyer explained that "mixed media" filters comprise granular active carbon missed with ion exchange resin. (Tr. (Knipmeyer) at 175:11-15.).

at 9.). Brita argued that “the field had been so well-studied by the time of invention that a skilled artisan would understand that filtration concepts were applicable across filter formats and applications.” (CSRBr. at 9 (citing Tr. (Freeman) at 1513:16-1514:9; Tr. (Knipmeyer) at 174:4-13, 175:8-24 (describing similarities in chemical filtration and mechanical filtration for mixed media and carbon block filter media, wherein they both have “chemical filtration where they can absorb ion exchange and mechanical filtration or physical filtration. Really the difference is in the size of the particle that is used. So granular media tends to be larger sizes. Carbon block tends to be smaller sized particles”); CX-0143C.0072 (listing testing results mixed media filters with over 10 ppm effluent lead concentration - the “current” Brita legacy, Maxtra and PUR filters); Tr. (Knipmeyer) at 168:5-171:22 (explaining testing results shown on CX-0143C.0072).). In other words, Dr. Knipmeyer explained that the activated carbon may have different sizes in different filter media of carbon block compared to mixed media, but the filter media both perform chemical and mechanical filtration.

Dr. Freeman testified that the “activated carbon and lead scavengers don’t know or care what filter format they’re in. They perform their function independent of how they’re organized and what their geometry is.” (*Id*. at 1513:24-1514:2.). Dr. Freeman explained that the prior art exists to translate the teachings to make and use other species of filters. (Tr. (Freeman) at 1518:3-8.).

Therefore, the weight of the evidence supports a finding of fact that the existing knowledge in the field at the time of the invention that became the ’141 patent fails to support Respondents’ argument that the various filter types are “entirely” different in form and function.

There is no dispute that water filtration and filter media types were well-known prior to the invention. Even Dr. Hatch admitted that “gravity-fed water filters have been known a long

time and used in homes to provide better-tasting, safer drinking water." (Tr. (Hatch) at 1461:14-19.).

Dr. Freeman described in some detail that there was extensive knowledge in the field of water filtration and about filter media types at the time of the invention in the '141 patent:

> Q. Were gravity-fed water filters considered a nascent technology prior to 2008?
>
> A. No. This technology has been around for decades, if not generations. It would have been one of the earliest ways that water filtration would have been accomplished.
>
> Q. And at the time of the invention, what types of filter media were known in the art?
>
> A. So there were a lot of types of filter media, things like nonwovens, there were the block filters, membrane filters, nanofiber filters, and several other mixed-media filters, several other classes of filters were well-known.

(Tr. (Freeman) at 1489:7-18.).

Brita had the better supported argument through Dr. Freeman's testimony and the evidence to which he cited that the form and function of chemical and mechanical filtration translate to at least some degree among filter types. Accordingly, the pervasive availability of existing knowledge in the field of water filtration that existed before the '141 patent supports a factual finding that the disclosure of a generic filter media satisfies written description in the '141 patent.

ii. Extent and Content of the Prior Art of Water Filtration and Filter Media Types and Maturity of the Science of Water Filtration

There also appears to be no dispute that the various filter types are well-known. Again, Dr. Hatch acknowledged that filtration media materials in gravity-fed water filters were well-known prior to the invention in the '141 patent, such as loose granular carbon, nonwovens, depth media, nanofibers, certain ligands, and zeolites. (Tr. (Hatch) at 1461:20-23, 1462:11-14,

1465:18-1466:12.).

Dr. Freeman corroborated Dr. Hatch's acknowledgement and expanded on the state of the art of water filtration that was well-known at the time of the invention by citing to several handbooks that existed and that were descriptive on the teachings of other species of filters that were known and used by 2007 (Tr. (Freeman) at 1518:3-8; CX-0842 (Handbook of Filter Media Chapter 8 on membrane filters); CX-0843 (Handbook of Nonwoven Filter Media); CX-0836 (*Polymer* article); Tr. (Freeman) 1495:21-1496:2 (explaining the *Polymer* article CX-0836 as describing nanofibrous, nonwoven mats made by electrospinning in filtration applications); RX-0631 (Rinker application); Tr. (Freeman) at 1497:3-12 (explaining the Rinker application RX-0631 incorporated by reference in the '372 application and discussing nonwoven filter sheets with porous carbon blocks); Tr. (Freeman) at 1498:15-23 (describing nanoparticles, nanofibers, ligands as well-known in filtration).).

Dr. Freeman also offered his uncontradicted, credible opinion and specific fact-based testimony that known filtration concepts at the time of the '141 invention were applicable across filter media types. (Tr. (Freeman) at 1513:16-1514:9 ("there was so much information available, not only in the patent, but also in the art in this really well-studied field that would allow a person of skill in the art to take the teachings on carbon blocks in the '141 patent and apply those to other filter media.")). Dr. Hatch offered no rebuttal testimony to Dr. Freeman's testimony about the applicability of filtration concepts to various filter media types.

In sum, rather than being a nascent area, water filtration was well-known. (Tr. (Freeman) at 1489:7-18.). The weight of Dr. Freeman's uncontested and credible testimony, together with the written evidence to which Dr. Freeman cited, leads to a factual finding that at the time of the '141 invention, the state of the art with respect to certain known filter media was mature and

well-known and understood. Dr. Hatch did not offer rebuttal testimony about maturity of the art.

Accordingly, the factors with respect to the extent and content of the prior art of water filtration and filter types, and maturity of the science of water filtration support a factual finding that generic filter media were well-known and as described in the ’141 patent, also meet the written description requirement.

iii. Predictability of Filter Media in Gravity-Fed Water Filters

Respondents and Brita did not argue about predictability of filter media in gravity-fed water filters in the context of the written description requirement. However, Dr. Freeman testified that there are numerous writings on the state of gravity-fed filters, to the point that the field could be considered predictable:

> Q. How do those factors inform your opinion as to the enablement of the certain claims?
>
> A. So the nature of the invention is gravity-fed water filters, and we've heard several times today that this is a well-known field and has been known for many decades if not longer.
>
> As a result of that, there's been a lot of study, and there's a lot of information available about how to make such filters, what are the components that go into them, how do they perform, the basic theory underpinning them so that they can be modeled. And so the art in that sense is rather *predictable*.

(Tr. (Freeman) 1519:21-1520:6 (emphasis added).).

Dr. Hatch testified about the unpredictability about the FRAP factor itself and how FRAP variables affect one another. (Tr. (Hatch) at 1437:12-18).). However, Dr. Hatch did not offer rebuttal testimony about the predictability in the art about the various filter media embodiments of gravity-fed water filters that existed in the art at least in 2007, or that are reflected in the ’141 patent.

Based upon the weight of the evidence, and Dr. Freeman’s credible testimony, it is a

factual finding that gravity-fed water filters and various filter media types were well-known, studied and written about extensively in the art before 2007 to the point of being applicable to different filter media types, and could be considered to be predictable. Moreover, it is a factual finding that the '141 patent's disclosure of various filter media in gravity-fed water filters meet the written description requirement.

iv. The Nature and Context of the Invention Support Adequate Written Description

The foregoing factors, i.e., (a) the existing knowledge in the field of water filtration and filter types, (b) the extent and content of the prior art of water filtration and filter types, (c) the maturity of the science of water filtration, and (d) the predictability of filter media in gravity-fed water filters, all support a factual finding that the '141 patent disclosures on the described issues meet the written description requirement. *Ariad*, 598 F.3d at 1351 (reciting factors to evaluate adequacy of disclosure for generic claims). The existing knowledge before 2007 also supports a factual finding that the various filter types that have chemical and mechanical filtration were well- known in the art. (*See* Section XII(C)(4)(e)(i), *supra*.).

Accordingly, the weight of the evidence, together with Dr. Freeman's often unrebutted or corroborated testimony, as described above, supports a factual finding of fact and law that the '141 patent discloses working examples for carbon block technology and other filter media, such that the written description requirement is met for the '141 patent.

5. Other arguments

a) Carbon Block Filters Are Unique

Respondents argued that each practicing example disclosed in the '141 patent is a carbon-block filter, and that the '141 patent disparages non-carbon block filters. (RPBr. at 111; RSBr. at 13-14.). Respondents also argued that the '141 patent describes the carbon blocks of the claimed

filter invention as "unique" in their ability to meet the claimed FRAP factor values. (RSBr. at 23; JX-0022 at 26:63-65.). To that end, Respondents noted that Dr. Hatch testified that the '141 patent states that no mixed media met the FRAP factor range. (Tr. (Hatch) at 1444:18-23; JX-0022 at 26:57-65 ("Filters tested include . . . commercially available mixed media filters produced by BRITA® and PUR®. Based on the results from testing, the FRAP factors were calculated . . . . No mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead."), *see also* Chart No. 15, *supra* (Working Examples in Table 5 of the '141 Patent) (including orange highlighting of water filters that do not meet the FRAP factor limitation).)

Respondents argued that the holding in *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1156 (Fed. Cir. 1998) ("*Tronzo*") supports a conclusion that a specification cannot show possession of generic claims where the specification distinguishes the disclosed invention from the claimed generic subject matter. (RSBr. at 16 (citing *Tronzo*, 156 F.3d at 1156 (finding that a disclosure of only conical shaped cups while distinguishing prior art as inferior did not support the claimed generic subject matter).).

However, Brita persuasively argued that more recent precedent fits the facts of this Investigation more closely than *Tronzo*. In *ScriptPro*, the Federal Circuit held that a focus on one embodiment does not limit the described invention where the specification describes other embodiments or purposes. (CSBr. at 10-11 (citing *ScriptPro*, 833 F.3d at 1341 (holding express disclosure of different ways of sorting and storing, as opposed to disclosing only one way of sorting and storing, does not limit the invention)).). In *ScriptPro*, the Federal Circuit explained that a description of an embodiment as "inconvenient" does not constitute "disparagement" when the same specification later also includes those "inconvenient aspects" as part of the invention.

Id.

Likewise here, while the ’141 patent states no mixed media filters met the claimed FRAP factor values, the ’141 patent also expressly states that “[t]he FRAP factor criteria set forth herein is applicable to all embodiments …including but not limited to mixed media (carbon and ion exchange resin), carbon blocks . . . .” (JX-0022 at 26:30-34.). Thus, the “inconvenient feature” of a mixed media filter is described as being part of the invention in the ’141 patent, by analogy to *ScriptPro*. Therefore, the particular tested mixed media filters that do not meet the claimed FRAP factor values do not limit the claimed invention in the context of the written description, and the written description is met.

b) New Technology

Respondents argued that Dr. Knipmeyer “was unequivocal that Brita did not create any practicing filters other than carbon block” and she admitted that “new technology” would be needed to have a non-carbon block embodiment. (RSBr. at 18 (citing (Tr. (Knipmeyer) at 202:9-204:12, RX-2607C (Knipmeyer Dep.) at 327:15-328:6.). However, as Brita correctly argued, the written description requirement does not require actual reduction to practice. *Ariad*, 598 F.3d at 1352. As in *Centrak*, an inventor admission of not having working examples of all embodiments is not fatal to meeting the written description requirement because the nature and context of the invention must be considered. (*See* Section XII(C)(4)(e), *supra*.).

The disclosure in the ’141 patent of carbon block technology is a disclosure that meets the written description requirement because black letter law with respect to written description does not require working examples of all embodiments. For the reasons described above, the weight of the evidence supports a finding of fact that the inventors has possession of the invention as disclosed in the ’141 patent in view of the nature and context of the invention, and

that the invention as disclosed meets the written description requirement.

c) Written Description of FRAP Factor Ranges

Respondents argued the ’141 patent failed to disclose the entire performance range for all possible values of the FRAP inputs/factor. (RPBr. at 101; RSBr. at 29.). Respondents argued that there are insufficient working examples to disclose certain FRAP factor ranges or full, unbounded ranges. The written description reasonably conveys possession, as supported by the nature and context of the invention, as discussed above. (*See* Section XII(C)(4), *supra*.).

6. Conclusion

The asserted claims, 1, 2, 3, 4, 5, 6 and 23, as a finding for fact and law, all have an explicit basis in the specification and as originally filed. (*See* Section XII(C)(3), *supra*.). The specification discloses numerous filters, accompanied by examples of flow rate, volume, lifetime, effluent lead concentration, and FRAP Factors that embody the claimed invention. (*See* Section XII(C)(4)(b), *supra*.). The field of water filtration and various filter types were well-known and extensive, mature, and favored predictability, as supported by the credible testimony of Dr. Freeman. (*See* Section XII(C)(4)(e)(ii), *supra*.). The nature and history of the invention and prior art, which are explicitly described in the ’141 patent, also support that working examples for all types of filter media are not required to meet the written description requirement.

When the specification of the ’141 patent is examined in its entirety, and when all of the physical descriptions of filters, filter media, filters that Dr. Knipmeyer tested, the concrete characteristics of the FRAP variables that are well-described, the disclosures of other physical characteristics such as absorbent and lead scavengers, are considered, the weight of the evidence supports a factual finding that the written description is met consistent with *Ariad* and other

precedent cited. It is a finding that Respondents have failed to prove by clear and convincing evidence that the written description requirement is not met by the ’141 patent.

D. Enablement

1. Legal Standard – *Wands* Factors

Section 112 provides the statutory basis for the enablement requirement:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the same.

35 U.S.C. § 112, ¶ 1 (Pre-AIA).

The enablement requirement ensures that “any person skilled in the art” can “make and use” the invention upon reading the patent. The standard for enablement is whether a person skilled in the art can “make and use” the invention “without undue experimentation.” *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988) (finding enablement where the disclosure provided considerable direction and guidance, working examples, in combination with a high level of skill and that methods to practice the invention were well-known).

The Federal Circuit interprets 35 U.S.C. 112, first paragraph, as providing a written description requirement that is separate from the enablement requirement. *Ariad*, 595 F.3d at 1344, 1351 (citing *Vas-Cath*, 935 F.2d at 1562-63). Unlike the written description requirement, which is a question of fact, the enablement requirement is a question of law. *Ariad*, 595 F.3d at 1351; *Amgen Inc. v. Sanofi, Aventisub LLC*, 987 F.3d 1080, 1084 (Fed. Cir. 2021) (“*Amgen*”), *cert. granted in part sub nom. Amgen Inc. v. Sanofi*, 143 S. Ct. 399 (2022) (denying certiorari as to whether enablement is a question of law; granting certiorari as to whether the full scope of the claimed embodiments must be enabled).

“Sufficiently routine” experimentation that would be reasonable to the skilled artisan to

carry out does not preclude a finding of enablement. *Amgen*, 987 F.3d at 1085. Lack of enablement requires finding "undue" experimentation to make and use the invention. Factual considerations, now known as the *Wands* factors, guide the inquiry as to whether a person skilled in the art would require "undue" experimentation to make and use the invention. *Amgen*, 987 F.3d at 1084. "Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Wands*, 858 F.2d at 737.

The *Wands f*actors are:

> (1) the quantity of experimentation necessary,
> (2) the amount of direction or guidance presented,
> (3) the presence or absence of working examples,
> (4) the nature of the invention,
> (5) the state of the prior art,
> (6) the relative skill of those in the art,
> (7) the predictability or unpredictability of the art, and
> (8) the breadth of the claims.

Id.

The *Wands* factors "are illustrative, not mandatory" and there is no requirement to consider all of the *Wands* factors. *Streck, Inc. v. Rsch. & Diagnostic Sys., Inc.*, 665 F.3d 1269, 1288 (Fed. Cir. 2012) ("*Streck*") (quoting *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991)). In *Streck*, true reticulocytes and analogs worked in the same way and were virtually indistinguishable, and experimentation was not undue to make and use the invention. *Id.* at 1290-91. A *Wands* analysis usually considers identification of embodiments that are asserted to not be enabled "so that breadth is shown concretely and not just as an abstract possibility, and how much experimentation a skilled artisan would have to undertake to make and use those products or processes." *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 959 F.3d 1091, 1100 (Fed. Cir. 2020) ("*McRO II*") (citations omitted). In *McRO II*, the novel aspect of the

invention was related to a set of rules to output mouth shapes. *Id*. at 1102. Lack of enablement required a finding that the challenger "identify specifics that are or may be within the claim but are not enabled." *Id*. at 1104.

A patent is presumed to be valid. 35 U.S.C. § 282. Therefore, lack of enablement requires clear and convincing evidence. *Streck*, 665 F.3d at 1288. "Enablement is determined from the viewpoint of persons of skill in the field of the invention at the time the patent application was filed." *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000) (finding enablement of claims to bacterial strains where methods to practice the invention were conventional and used well-known genetic engineering techniques). A specification does not need to "describe how to make and use every possible variant of the claimed invention," but "when a range is claimed, there must be reasonable enablement of the scope of the range." *Amgen*, 987 F.3d at 1084-85 (quoting *McRO II*, 959 F.3d at 1100).

While the written description requirement and enablement requirement may rise and fall together, they need not always do so. *Ariad*, 598 F.3d at 1352. Unlike written description, which is an objective inquiry into what the specification describes, the enablement analysis may rely on the knowledge of a person skilled in the art. For example, claims may be present that do not require undue experimentation, but an invention that has not yet been invented, cannot be described. *Id*. (citing *In re DiLeone*, 436 F.2d 1404, 1405 (C.C.P.A Feb. 11, 1971) ("*DiLeone*")). The Federal Circuit explained in *DiLeone* that an invention may be enabled as broadly claimed, but not describe the invention. *DiLeone*, 436 F.2d at 1405. As an example, "consider the case where the specification discusses only compound A and contains no broadening language of any kind. This might very well enable one skilled in the art to make and use compounds B and C; yet the class consisting of A, B and C has not been described."). *Id*. at

n.1.

"It is the specification, not the knowledge of one skilled in the art, that must supply the novel aspects of an invention in order to constitute adequate enablement." *Idenix Pharm. LLC v. Gilead Scis., Inc*., 941 F.3d 1149, 1159 (Fed. Cir. 2019) ("*Idenix*") (finding non-enablement where the need to screen thousands of molecules for HCV efficacy required a large quantity of experimentation, and rejecting that a POSA's knowledge would guide testing to a predictable group of compounds).

2. Respondents' Arguments

Respondents argued that the broad range of filter types is not enabled in view of the specification that enables only a carbon block filter. (RPBr. at 113-15; RBr. at 91-93; RSBr. at 41-47.). Respondents contended that the broad functional ranges of the asserted claims are not enabled. (RPBr. at 115-16; RBr. at 94-96; RSBr. at 47-51.). Respondents also argued that application of the *Wands* factors demonstrates that the breadth of the claims are not supported. (RPBr. at 116; RSBr. at 51-54; *see also* RBr. at 96-100.).

Respondents, who had the burden of proof, grouped their *Wands* arguments into a group of *Wands* factors 4, 2, and 3 (in their brief, *Wands* factors 2, 6 and 7, respectively), a group of *Wands* factors 5 and 6 (in their brief, *Wands* factors 3 and 4, respectively), and argued more substantively and focused on *Wands* factor 8 (in their brief, *Wands* factor 1). (RPBr. at 112-17; RSBr. at 51-54.). Respondents broadly addressed *Wands* factors 1 and 8, but ultimately the opinion of their expert, Dr. Hatch, on *Wands* factor 1 was conclusory. (Tr. (Hatch) at 1432:13-1435:5 (FRAP factor values); 1438:14-1439:13 (filter media embodiments).).

In its Pre-Hearing Brief, Brita argued that the deposition testimony of Dr. Hatch ignored the express disclosures of the '141 patent and failed to adequately account for the state of the

prior art, and the knowledge and skill of a skilled artisan. (CPBr. at 120-21 (citing Freeman Rebuttal Rep. at ¶¶ 70, 73).).[76] Brita also disputed that Dr. Hatch's testimony was sufficient for Respondents to sustain this lack of enablement argument based on weighing the evidence that supports the *Wands* factors. (CPBr. at 120-123; CSRBr. at 18-26.).

The Federal Circuit has explained that "[w]hether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Amgen*, 987 F.3d at 1084 (quoting *Wands*, 858 F.2d at 737). "The factors set forth in *Wands* then provide the factual considerations that a court may consider when determining whether the amount of that experimentation is either 'undue' or sufficiently routine such that an ordinarily skilled artisan would reasonably be expected to carry it out." *Id.* at 1084-85 (citations omitted).

As explained in more detail below, an analysis of the relevant *Wands* factors and the evidence the Parties offered fails to support a finding of fact or law that undue experimentation is required to reach the full scope of the FRAP factor, its variables, and filter media types in the asserted claims. (*See* Section XII(D)(3), *infra* (*Wands* analysis); *see also* JX-0022 at 1:23, 1:66-2:2.).

Respondents have failed to prove by clear and convincing evidence that the claims, including the full scope of the FRAP factors and types of filter media, are not enabled.

a) ***Wands*** **Factor 1 – Quantity of Experimentation**

Experimentation may be "considerable," yet not rise to experimentation consistent with non-enablement, so long as it is "merely routine" or the specification "provides a reasonable amount of guidance." *Wyeth & Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380, 1386 (Fed. Cir.

[76] The Freeman Rebuttal Report is not in evidence.

2013) ("*Wyeth*") (quoting *Johns Hopkins Univ. v. CellPro, Inc.,* 152 F.3d 1342, 1360-61 (Fed.Cir.1998)). In *Wyeth*, the Federal Circuit found that synthesizing and screening tens of thousands of candidate compounds would require undue experimentation where the specification provided only a starting point for further iterative research in an unpredictable and poorly understood field. *Id.* at 1386.

The analysis of undue experimentation is a "matter of degree," and the experimentation must not be "unduly extensive." *Cephalon, Inc. v. Watson Pharms., Inc.*, 707 F.3d 1330, 1338 (Fed. Cir. 2013) ("*Cephalon*").

> Extensive experimentation does not necessarily render the experiments unduly extensive where the experiments involve repetition of known or commonly used techniques. *See Johns Hopkins Univ. v. CellPro, Inc.,* 152 F.3d 1342, 1360 (Fed.Cir.1998) (finding that the difficulty in producing certain antibodies could not be attributed to the shortcomings in the disclosure of the patent at issue, but rather, the difficulty was attributed to the technique commonly used during experimentation that generally required repetition). Thus, the focus "is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance. . . ." *PPG Indus., Inc.,* 75 F.3d at 1564 (citation and quotation omitted).

Cephalon, 707 F.3d at 1338–39.

Respondents did not directly brief the quantity of experimentation that a person of skill might require, *Wands* factor 1, in its Pre-Hearing Brief or Post-Hearing briefing. Rather, Respondents argued that there was undue experimentation based on *Wands* factors 2-6 and 8.

In its Pre-Hearing Brief, Brita stated that Dr. Freeman would testify at the Hearing about the routine nature of testing filters. (CPBr. at 122.). Brita argued that Dr. Hatch failed to present evidence that a longer than routine time to make and test a filter would be required to determine that it falls within the scope of the asserted claims. (*Id.* at 122-23.).

In Post-Hearing briefing, Brita argued that a skilled artisan could make other embodiments "in relatively short time" based on routine testing, knowledge in the art, and

foundational knowledge provided by the working examples. (CSRBr. at 23-25 (citing Tr. (Freeman) at 1524:5-11).).

i. FRAP Limitation Under 350

While Dr. Hatch did not focus or give an opinion on "quantity" of experimentation to reach the full range of the FRAP factor values, he did provide testimony on whether there was undue experimentation, by relying on *Wands* factors 2, 3 and 8, as detailed in the excerpt of his testimony below. (Tr. (Hatch) at 1432:13-1435:5 (FRAP factor values), 1438:14-1439:13 (filter media embodiments).). Because there is no substantiation for Dr. Hatch's testimony and Respondents' argument, Respondents have abandoned, withdrawn and/or waived any argument on this issue under Ground Rules 7.2 and 10.1.

> Q. Dr. Hatch, with respect to the asserted claims in your enablement opinions, did you consider whether the specification enables a person of skill in the art to make the invention without undue experimentation?
>
> A. Yes, I did.
>
> Q. And, again, what was your determination?
>
> A. Here I list the main issues involved is, again, the absence of working examples showing how filters could meet those missing ranges. The working examples are not there.
>
> And there are no -- as we pointed out, there's no direction or guidance to either modify the existing carbon block filters to make filters to achieve those missing ranges.
>
> And, of course, the breadth of claims that are claimed in claims 1 through 6 with regard to volume, flow, and the lead value and the life are such wide claims and are not represented by any filter in the '141 patent.
>
> So one skilled in the art, just relying on prior art, would not be able to enable the person of skill in the art to make these working examples from these other filter techniques without undue experimentation.

(Tr. (Hatch) at 1432:13-1433:9.).

At best, Dr. Hatch's testimony was conclusory; it was given little weight or credibility.

Much of his testimony was not accurate or complete, as cross-examination exposed (*See infra*.).

ii. Filter Embodiments Other Than Carbon Block Filters

Dr. Hatch and Dr. Freeman both attempted to explain why there would be undue experimentation to make and use filters other than carbon block.

For example, Dr. Hatch and Dr. Freeman both opined on the particular type of water filter that uses nonwoven filter medium. Dr. Hatch testified as to the amount of experimentation to implement the filter media disclosed in the ’141 patent, especially a nonwoven filter medium. (Tr. (Hatch) at 1439:9-1440:21.).

> A. . . . So a person of skill in the art having perhaps only the prior art to guide him and nothing more, nothing in the ’141 patent to guide him, would not be able to make or use these other filter techniques without undue experimentation.
>
> Q. Okay. Dr. Hatch, weren’t mixed-media filters, membrane filters, nonwoven filters, depth media filters, nanoparticle filters, nanofiber filters, and ligands filters known in the prior art?
>
> A. Oh, yes, they were.
>
> * * *
>
> Q. Dr. Hatch, if the [mixed-media filters, membrane filters, nonwoven filters, depth media filters, nanoparticle filters, nanofiber filters, and ligands] filters are known in the art and persons of skill in the art knew about them, then why is it that it takes undue experimentation to implement the asserted claims of the ’141 patent into these filter types?
>
> A. Well, first of all, you have to understand the detail of experimentation and you have to go through -- which in my 49 years of experience -- I’ve done it many times, and it takes ***a lot of experimentation*** to take what’s required to remove particulate lead and soluble lead and incorporate that technology into a gravity-fed filter.
>
> Currently there are probably four or five different - - at least four or five different lead absorbents on the market, and you would have to take each one of those and study each one. They’re all probably - - I know they’re all different particle sizes, and how do you incorporate them into a ***nonwoven*** to allow enough of it to be there to absorb soluble lead and also make the nonwoven material fine enough to filter the extremely fine .1 micron particles of lead. I’ve done it, and it takes -- believe me, it takes an undue amount of experimentation.

(Tr. (Hatch) at 1439:9-1440:21 (emphases added).).

Dr. Hatch did not provide explicitly supported evidence with his opinion on either the quantity of experimentation necessary to have arrived at carbon block filters or any of the filter media that the ’141 patent discloses. Nor did he explain what undue experimentation is. All he said was that it requires “a lot” of experimentation. (*Id.*).

In contrast, Dr. Freeman provided testimony about the level of experimentation needed to translate the teachings of a carbon block filter to, for example, a nonwoven filter. (Tr. (Freeman) at 1521:8-12.). Dr. Freeman testified that a person of skill would know: (a) the filter volume; (b) lead scavenger component; (c) activated carbon component; (d) “how closely compressed the activated carbon and lead scavenger had been with their -- with the binder,” and together those “would give an idea of the pore size that was available for filtration.” (*Id.* at 1521:13-18.). Dr. Freeman explained that “because the components and raw materials that go into the filter are going to ***perform their function in any filter media*** that they’re put into” that “***after some experimentation***, but not undue experimentation,” comparable performance would be achieved. (Tr. (Freeman) at 1521:19-1522:1 (emphases added).).[77]

[77] Dr. Hatch did not testify about the number of hours to bring a water filter to market. When asked during the Hearing, Dr. Freeman acknowledged that he did not take into account that Brita took ten years and 7,326 hours of research and development to design a nonwoven filter that practices the ’141 patent. (Tr. (Freeman) at 1562:18-1563:6.). However, Dr. Freeman testified that he had experience in developing an invention from the “aha moment” to “commercial products that are in the market. And in each of those cases it took about ten years from the time of the initial discovery until the product is actually in the market[.]” (Tr. (Freeman) at 1647:4-11.).

There is insufficient evidence that the time it took Brita was unreasonable in light of the context of the invention and bringing the product to market. Moreover, the Federal Circuit has rejected a “numerosity” or “exhaustion” requirement. *Amgen Inc. v. Sanofi, Aventisub LLC*, 850 F. App’x 794, 796 (Fed. Cir. June 21, 2021) (denying petition for panel rehearing en banc). In its order denying rehearing en banc, the Federal Circuit explained that that the claims in *Amgen* were not enabled, not only because of the numerous species or that each and every embodiment had to be enabled, but that the specification was

Dr. Freeman also opined that the knowledge from the '141 patent and carbon block filter would apply to a mixed media filter:

> Q. . . . [C]an you explain in your opinion the degree of experimentation required for a person of ordinary skill in the art to take examples and disclosure in the '141 patent and to make a, say, a mixed media filter that met a FRAP factor of below 350?
>
> A. So I think it's important to realize that in this field it is routine to test filters to determine their performance. And so a person of skill in the art, if they had a head start from the '141 patent and the information about the carbon block, could then use that knowledge and the materials to make a mixed-media filter and achieve a FRAP factor of less than 350 in relatively short time.

(Tr. (Freeman) at 1523:25-1524:11.).

In other words, Dr. Freeman offered an opinion that not only discussed carbon block filter media, but that also applies to other types of filter media that are disclosed in the '141 patent.

In *Amgen*, the Federal Circuit held that claims reciting broad functional limitations were not enabled by a disclosure that provided only a narrow scope of working examples, inadequate guidance, and directed to a field of invention that was unpredictable. *Amgen*, 987 F.3d at 1087-88. "A substantial amount time and effort" was found required either by trial and error based on the disclosure, or to discover antibodies *de novo* from millions of candidates, in order to "reach the full scope of claimed embodiments." *Id*. at 1088.

Unlike in *Amgen*, which involved experimentation related to ***millions*** of candidates, Dr. Hatch acknowledged that at least ***4-5 lead scavengers*** are well-known, nonwovens are well-

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broad, "extending far beyond the examples and guidance provided" and the "narrow and limited guidance in the specification made far corners of the claimed landscape that were particularly inaccessible or uncertain to make unenabled." *Id*. Therefore, the amount of time it may take to produce different embodiments is not persuasive in the context of the *Wands* analysis as a whole, particularly the state of the art, which has extensive knowledge of water filtration, testing is routine, and filter media are well-known. (*See* Section XII(D)(2)(e), *infra* (*Wands* Factor 5).).

known, and the experimentation relates to how to incorporate the two together.[78] (Tr. (Hatch) at 1439:23-1440:21.). Dr. Freeman opined that testing is routine, and that the '141 patent and knowledge of a person having skill in the art would require some experimentation to make the claimed filters. Dr. Hatch also testified that testing of the variables, **V**, **f**, $\mathbf{c_e}$, **L**, are easy or routine for a person skilled in the art. (Tr. (Hatch) at 1434:16-1435:20.). Moreover, the various embodiments of filter media themselves are well-known. (*See* Section XII(D)(2)(e), *infra* (*Wands* Factor 5); Section X(C)(4), above (describing written description of filter media embodiments).).

As explained in *Cephalon*, a "considerable amount of experimentation" is acceptable if it routine or there is guidance in the specification. *Cephalon*, 707 F.3d at 1339. This Investigation is more similar to *Cephalon* because of the state of the art and guidance in the disclosure. (*See* Sections XII(D)(2)(e), (b) *infra* (*Wands* factors 5, 2).). Unlike in *Amgen*, which involved an unpredictable field of science, inadequate guidance in the specification, and a narrow scope of disclosed examples in relation to a claim that could encompass searching among millions of candidates, *Amgen*, 987 F.3d at 1087-88, this Investigation is in a well-known field of water filtration. (*See* Section XII(D)(2)(e), *infra*). Rather than searching for new antibodies, as in *Amgen*, water and its treatment are known. The state of prior art is one that includes extensive knowledge of water filtration, testing is routine, and many filter media are well-known. (*See* Section XII(D)(2)(c), *infra* (*Wands* factor 3) (describing working examples in the '141 patent); Section XII(D)(2)(e), *infra* (*Wands* factor 5) (describing the state of the art as described in the

[78] Dr. Hatch admits that the various filter media are well-known, which is a party admission. (Tr. (Hatch) at 1439:14-18 ("Q. Okay. Dr. Hatch, weren't mixed-media filters, membrane filters, nonwoven filters, depth media filters, nanoparticle filters, nanofiber filters, and ligands filters known in the prior art? A. Oh, yes, they were.").).

’141 patent, and testimony of Dr. Hatch and Dr. Freeman on the state of the art.).).

Respondents had the burden of proof to show that the quantity of experimentation favors a finding of undue experimentation. Brita had the better supported argument, and credible opinion, through Dr. Freeman’s testimony. Therefore, it is not clear that the quantity of experimentation to reach the full scope of the invention rises to an impermissible amount. Accordingly, it is a finding of fact and law that the application of the *Wands* factor 1 to the evidence does not favor a finding of undue experimentation. In other words, Respondents’ evidence on *Wands* factor 1 was not clear and convincing.

b) *Wands* Factor 2 – The Amount of Direction or Guidance Presented

Respondents argued that the ’141 patent lacks direction or guidance to make or use filters with the claimed ranges of FRAP factor values in claims 1-2, the ranges of volume **V** in claims 3-4, the ranges of average filtration unit time **f** in claims 5-6, and to make and use non-carbon block filters. (RPBr. at 114-17; RSBr. at 52-53.).

In their Supplemental Post-Hearing Brief, Respondents grouped their argument of *Wands* factors 4, 2, and 3 together (2, 6, and 7, in their brief, respectively), and argued that the ’141 patent discloses only one type of working example, carbon block filters. Each formulation of the carbon block filter has the same activated carbon and uses one of two different lead scavengers. (RSBr. at 52 (citing (Tr. (Hatch) at 1438:19-23 (explaining only carbon block filters are made and tested in the ’141 patent); Tr. (Freeman) at 1561:20-23 (acknowledging working examples are carbon block), 1572:16-1574:12 (acknowledging Table 1 describes one type of activated carbon at one particular size, while “there’s a lot of choice in activated carbon” with respect to type of activated carbon, mesh size, geometry, size, amounting to hundreds of types of activated carbon).). Respondents indirectly suggested that the working examples of carbon block in the

’141 patent are not a source of guidance for the remaining filter blocks or full range of FRAP factor values.

Brita argued in its Pre-Hearing Brief that Dr. Freeman would testify during the Hearing about the type and amount of direction or guidance that the ’141 patent to make and use the invention. (CPBr. at 122.). In Post-Hearing briefing, Brita argued that the ’141 patent describes common structural, chemical, and design features that are applicable to filter media other than carbon block filter media. (CSRBr. at 22 (citing (Tr. (Freeman) at 1514:17-25 (describing common structural components of activated carbon and lead scavenger), 1579:12-16 (explaining Figures 21-23 informs a skilled artisan of trends to expect with the FRAP factor variables); JX-0022 at 13:30-34, 26:30-37, Fig. 21-23).).

In support of their argument on *Wands* factor 2, Respondents relied on Dr. Hatch’s testimony. Dr. Hatch testified and agreed with Brita and Dr Freeman that there are specific working examples with specific values in the ’141 patent for volume **V**, average filtration unit time **f**, and FRAP factor values in Table 5 of the ’141 patent. (Tr. (Hatch) at 1431:2-1432:22; RDX-0008.0030-33.). Table No. 12, below, annotates Table 5 of the ’141 patent with red boxes around values of volume **V**, average filtration unit time **f**, and FRAP factor.

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Table No. 12: Table 5 of the ’141 Patent

Enablement – All Claims

Table 5

	L (gallons)	f (min/liter)	V (cm³)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	[[58.6]]48.6
PA3-8	40	4.4	89	7.5	[[45.7]]36.7
PT3-4	40	4.2	89	6.3	[[38.7]]29.4
PT3-6	40	4.6	89	13.3	[[78.5]]68.1
PT3-4 alternate housing	40	4.6	89	1.3	[[16.6]]6.7
PT3-11	40	4.4	89	8.5	[[51.2]]41.6
PT3-13	40	4.2	89	9.2	[[52.7]]43.0
PT3-51	40	5.7	89	3.8	[[36.2]]24.1
PT3-53	40	5.1	89	2.3	[[24.2]]13.0
P2-8 lead sorbent free	40	3.4	89	52.8	[[208.4]]199.7
P2-6 lead sorbent free	40	2.3	89	87.1	[[223.1]]222.9
Cylindrical Block:					
Block 1	40	17.0	151	9.2	[[357.7]]295.2
Block 2	40	9.9	151	14.6	[[308.2]]272.8
Mixed Media:					
Brita Granular	40	5.5	128	42.2	[[386.7]]371.4
German Maxtra	40	4.9	145	43.8	[[402.3]]389.0
Pur 2 stage w/ timer	40	16.0	141	30.2	[[911.4]]851.6
Pur 2 stage w/ timer	40	10.4	141	36.6	[[706.8]]670.9
Pur 2 stage w/ timer	40	11.0	141	38.6	[[785.9]]748.4

- The presence or absence of working examples
- The amount of direction or guidance presented
- The breadth of the claims

JX-0022 at Table 5 (as corrected and annotated)

RDX-0008.34

(RDX-0008.0034 (JX-0022 at Table 5, ann.).).

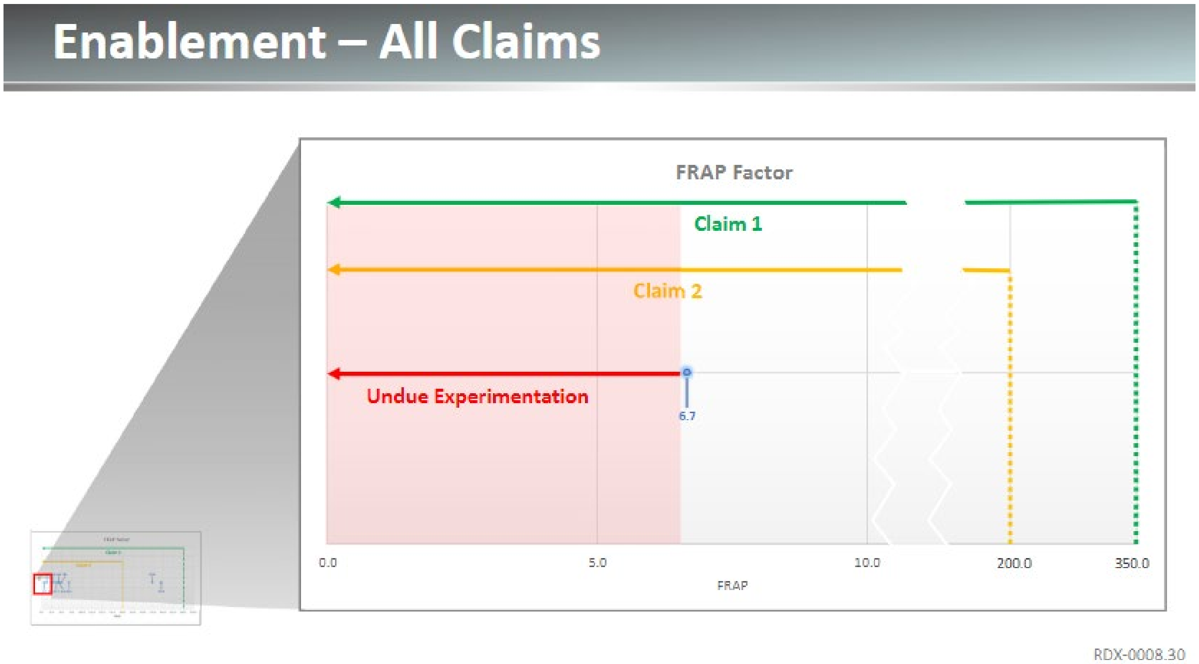
Table 5 of the ’141 patent, reproduced above in Table 12, shows embodiments of the invention that are working examples of the invention and labelled PA 3-5, 3-8; PT 3-4, 3-6, 3-4, 3-11, 3-13, 3-51, 3-53; Block 1 and Block 2. (JX-0022 at Table 5; Tr. (Knipmeyer) at 186:23-187:1 (testing of PA3-5, 3-8; PT 3-4 water filters).).

Using RDX-0008.0030-32, Dr Hatch nonetheless testified that there are “missing ranges” in the values of Table 5 compared to the claimed ranges, especially at the lower range of the FRAP factor value. (Tr. (Hatch) at 1431:5-1432:9; RDX-0008.0030-32.). The demonstratives that Dr. Hatch relied upon, reproduced below in Figure Nos. 25-27, depict the missing ranges that Respondents argued required undue experimentation.

Figure No. 25, below, depicts the claimed ranges of FRAP factor of about 350 or less (claim 1, in green (the higher range)), less than about 200 (claim 2, in yellow), and less than 6.7

(the range Respondents argued require undue experimentation, in red (the lower range).)

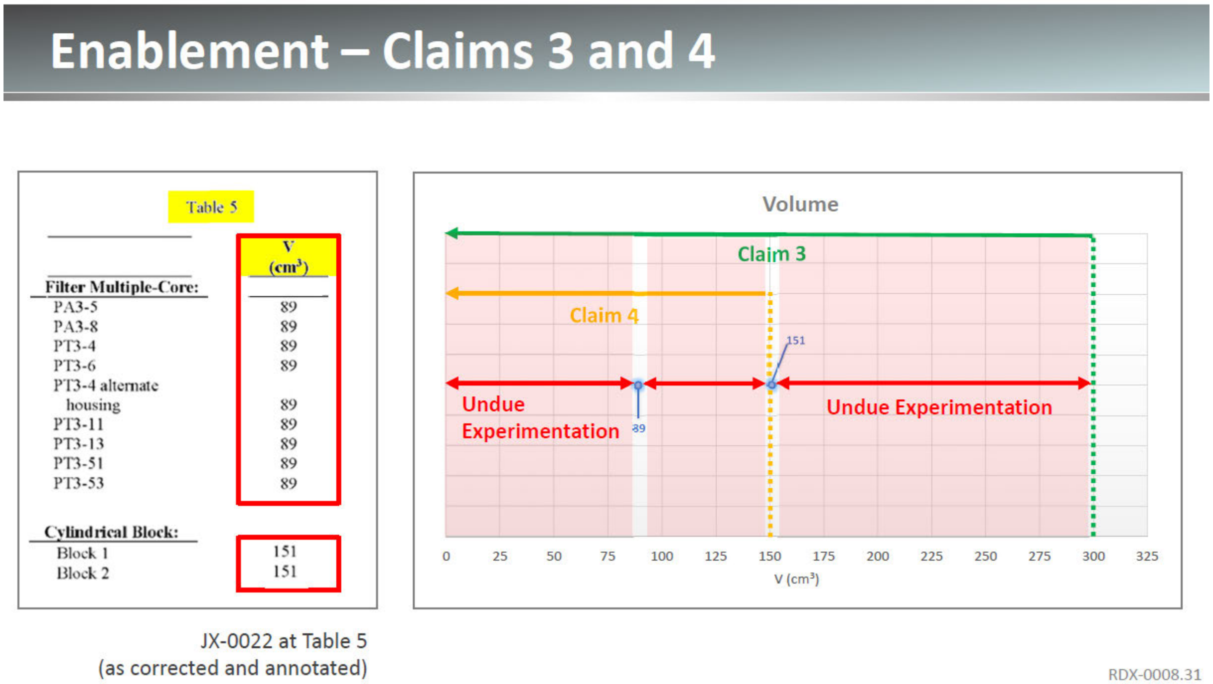
Figure No. 25: Scope of Enablement for FRAP Factor Values



(RDX-0008.0030 (depicting ranges of FRAP factor values, less than 350, 200, 6.7 (in green, yellow, red, respectively).).

Figure No. 26, below, shows the volume in the working examples of Table 5 (89 cm^3 and 151 cm^3, in blue), the claimed ranges of volume **V** less than about 300 cm^3 (claim 3, in green), less than about 150 cm^3 (claim 4, in yellow) and ranges of volume other than 89 cm^3 and 151 cm^3 (the ranges that Respondents argued require undue experimentation, in red).).

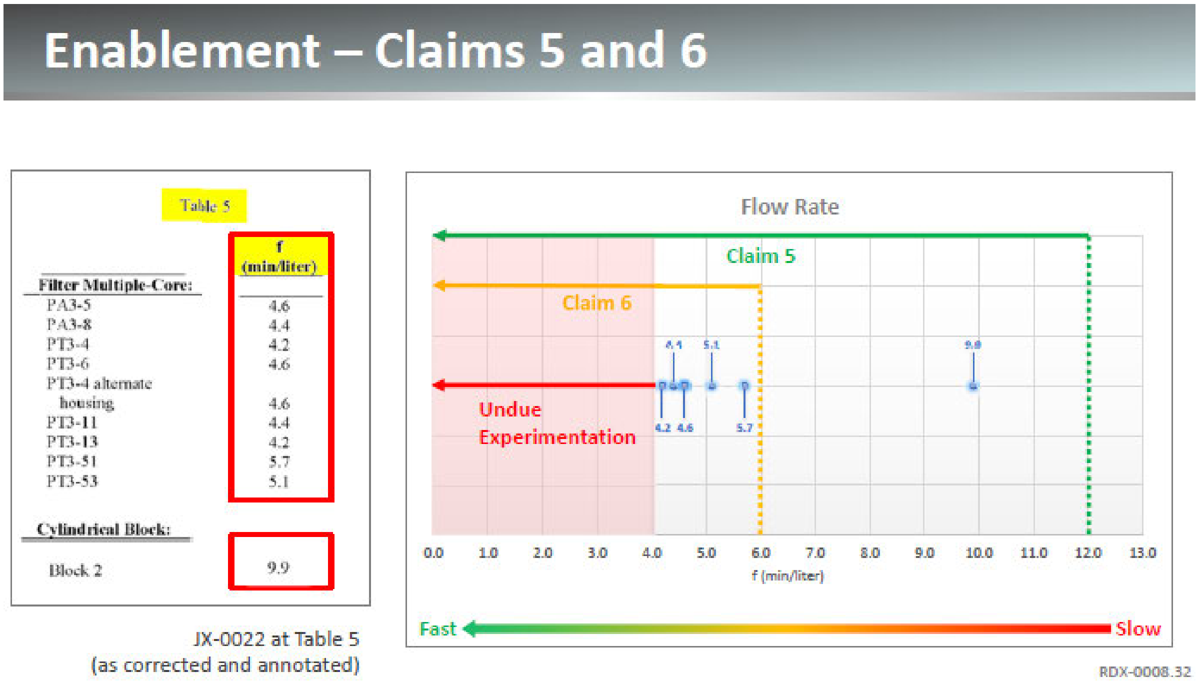
Figure No. 26: Scope of Enablement for Volume Values



(RDX-0008.0031 (excerpting volume **V** values of the FRAP factor from Table 5 of the ’141 patent; JX-0022 at Table 5 (ann.)).).

Figure No. 27, below, depicts the claimed ranges of filtration **f** less than 12 minutes per liter (claim 5, in green), less than 6 minutes per liter (claim 6, in yellow), and less than 4.2 minutes per liter (the range Respondents argued require undue experimentation, in red).)

Figure No. 27: Scope of Enablement for Average Filtration Unit Time Values



(RDX-0008.0032 (excerpting average filtration unit time **f** values of the FRAP factor from Table 5 of the ’141 patent); JX-0022 at Table 5 (ann.).).

Dr. Hatch testified about the ranges depicted in Figure Nos. 25-27, above, and stated that undue experimentation would be required to make and use the claimed invention because “as we pointed out, there’s no direction or guidance to either modify the existing carbon block filters to make filters to achieve those missing ranges.” (Tr. (Hatch) at 1432:23-1433:1.).[79] In other words, Dr. Hatch relied on data taken directly from the ’141 patent and opined that the ’141 patent discloses data points, but there are gaps in those data points. Dr. Hatch argued that the

[79] In related testimony on written description, Dr. Hatch testified that there are no directions for modifying the FRAP factor values to less than 6.7, or for modifying the volume **V** or average filtration unit time **f**. (Tr. (Hatch) at 1415:25-1416:3, 1419:2-1420:4, 1424:5-14.). Dr. Hatch testified that the gravity-fed water filter could “virtually almost include everything” such as embodiments of “membranes, nonwovens, depth media, nanoparticles, nanofibers and ligands” described in ’141 patent. (*Id.* at 1426:4-11 (citing JX-0022 at 26:30-37).). The findings on written description, Section XII(C), above, do not support Dr. Hatch’s testimony, which was given little weight and credibility in that Section.

’141 patent failed to provide guidance on how to make and use the full scope of the claimed invention, either as to FRAP values less than 6.7 or FRAP variable values of volume other than 89 cm^3 and 151 cm^3, and average filtration unit time values of less than 4.2 minutes per liter. (*Id.* at 1431:2-1432:9.).

Dr. Freeman, Brita’s expert on enablement, testified that the ’141 patent does include guidance on how the FRAP factor variables. (*See* Section V(B), *supra* (defining the FRAP factor and variables work together).). Dr. Freeman testified that the ’141 patent explains trends in how the variables of the FRAP factor interrelate at Figures 21-23 of the ’141 patent, which are reproduced below in Figure No. 28.

As described in the ’141 patent: “Figure 21 is a graphical representation of filter FRAP factors as a function of filtration unit time and volume. Figure 22 is a graphical representation of filter FRAP factors as a function of filtration unit time and lead reduction. Figure 23 is a graphical representation of filter FRAP factors as a function of filtration unit time and filter lifetime.” (JX-0022 at 9:8-13).). Figures 21-23 of the ’141 patent do not represent actual datapoints; the diamond, circle and triangle label the different lines. (Tr. (Freeman) at 1581:22-1582:2.). Figures 21-23 of the ’141 patent show “elements of the FRAP equation taken in pairs… And so this is designed to show how one could move the FRAP value with specific combination of, for example, lead concentration and filtration time” in Figure 22 of the ’141 patent. (*Id*. at 1580:24-1581:6.).

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Figure No. 28: FRAP Factor as a Function of FRAP Factor Variables

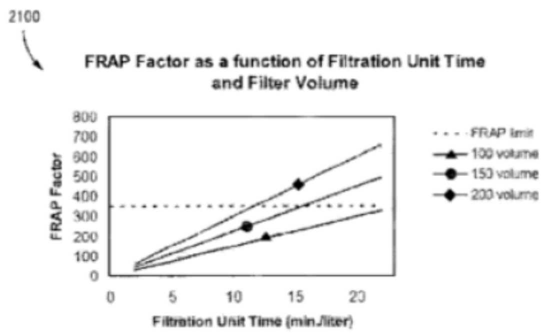

FIG. 21

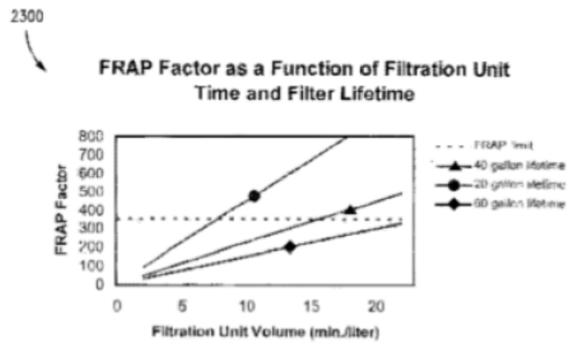

FIG. 23

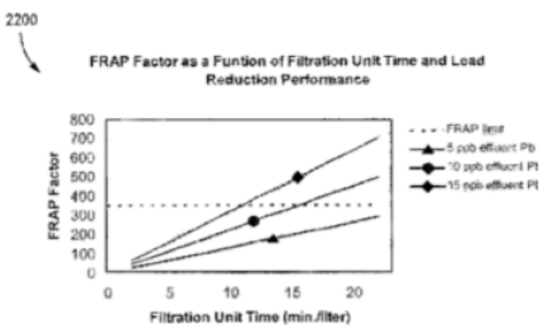

FIG. 22

(JX-0022 at Fig. 21-23.).

Dr. Freeman opined that Figures 21-23 of the ’141 patent teach “how these [FRAP factor] variables work together, and then, to do that, that would inform a person of skill in the art about the kinds of trends they should expect as they go out and make other embodiments and test other embodiments.” (Tr. (Freeman) at 1579:12-16.). Dr. Freeman also opined that taking the guidance from Figures 21-23 and “the inventive examples in the ’141 patent and then work outwards from there. And so that process could be very fast, in my opinion, and you’d have a head start based on the teachings of the ’141 patent.” (*Id.* at 1582:14-17.).

Dr. Freeman testified that there is guidance or direction in the ’141 patent to make filter

media other than carbon media.[80] Dr. Freeman testified that "additional guidance throughout the specification [that] provides information to a person of skill in the art about how to -- how to extend and expand on the working examples ***to other media*** and to other examples with different characteristics and different materials." (Tr. (Freeman) at 1520:22-1521:4 (emphasis added); JX-0022 at 13:30-34 (describing carbon block and granular filters), 26:30-37 (describing filter media embodiments of mixed media, carbon block, membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands).). Dr. Freeman explained that the working examples provide guidance, based on a skilled artisan's understanding of pore size and components of the filter, to make and use filters with other filter media. (*Id.* at 1521:13-18, 1522:21-24; *see* Section XII(D)(2)(c), *infra* (*Wands* factor 3).). In other words, Dr. Freeman provided some reasoning, that the working examples of carbon block are guidance to make and use filters comprising other filter media.

Given that the testimonies are conflicting, and given that Respondents had the burden of proof, when Dr. Freeman's explicit reference to and discussion of Figures 21-23 is examined, Brita and its expert have the better supported argument. The testimony of Dr. Hatch is not accurate. Therefore, Respondents did not clearly and convincingly prove that *Wands* factor 2 supports a finding that the '141 patent is not enabled. Accordingly, *Wands* factor 2 does not favor a finding that there would be undue experimentation to make the claimed invention of the '141 patent.

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[80] In related testimony on written description, Dr. Freeman opined about guidance in the specification. (Tr. (Freeman) at 1513:17-1515:2 ("Because there was -- there was so much information available, ***not only in the patent***, but also in the art in this really well-studied field that would allow a person of skill in the art to take the teachings on carbon blocks in the '141 patent and apply those to other filter media." and common structural requirements of activated carbon and lead scavenger) (emphasis added); JX-0022 at 13:30-34, 26:30-37).).

c) *Wands* Factor 3 – Working Examples

Respondents argued that there were no working examples of "granular carbon filters, pleated paper filters or alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc." to achieve the claimed FRAP factors in the '141 patent. (RPBr. at 116.). In their Supplemental Post-Hearing Brief, Respondents grouped their argument of *Wands* factors 4, 2, and 3 together (2, 6, and 7, in their brief, respectively), and argued that the only working examples in the '141 patent are for carbon block filter media. (RSBr. at 52-53; *see also* Section XII(D)(2)(b), *supra* (*Wands* factor 2).).

Brita indirectly argued about working examples in its Pre-Hearing Brief when Brita argued that there are "sufficient disclosures" in the '141 patent to enable the claimed invention. (CPBr. at 121.). In Post-Hearing briefing, Brita argued that a skilled artisan could take the carbon block working examples, in light of knowledge in a well-known field, to construct and configure filters with alternative filter media. (CSRBr. at 23 (citing Tr. (Hatch) 1461:16-23 (admitting gravity-fed filters are well-known), 1465:7-1466:12) (describing well-known gravity-fed water filters of nonwovens, depth media, nanofibers, ligands, zeolites), 1466:13-17, 1467:6-9 (configuring different filter media by a skilled artisan).). Dr. Hatch did not disagree that these filters, filter media or configurations to obtain certain desired benefits are well-known.

In support of Respondents' arguments, Dr. Hatch testified that undue experimentation would be required to make and use the claimed invention because of "the absence of working examples showing how filters could meet those missing ranges. The working examples are not there." (Tr. (Hatch) at 1432:13-22; *see also id.* at 1433:10-19; RDX-0008.0034.).[81] As

[81] In related testimony on written description, Dr. Hatch testified that are "no working examples in the '141 patent that exhibited a FRAP value below 6.7." (Tr. (Hatch) at 1416:12-13.).

discussed above for *Wands* factor 2, Dr. Hatch relied on data taken directly from the '141 patent and opined that the '141 patent discloses data points, but there are gaps in those ranges of data points that have no working examples. Accordingly, Dr. Hatch argued a skilled artisan could not make and use the full scope of the claimed invention, either as to FRAP values or FRAP variable **V**, **f** values. (Tr. (Hatch) at 1432:23-1433:1, 1433:6-9, 1434:1-7.).

In support of Respondents' arguments about filter media other than carbon block filter media, Dr. Hatch opined that "they claim these other filtration techniques" but "there's no working examples of any of these other filtration techniques mentioned in the presentation [i.e., the '141 patent]." (Tr. (Hatch) at 1438:24-1439:2.). When asked why the inventors "did not possess these filter types," Dr. Hatch replied "it's actually stated in the presentation [the '141 patent] here in column 26, lines 60-65, that . . . there are no mixed-media filters that met the claimed FRAP factor range due to their inability to remove particulate lead[.]"[82] (Tr. (Hatch) at 1444:14-23; RDX-0008.0038.). Figure No. 29, below, highlights (in yellow with red underscore) this statement from the specification of the '141 patent and also lists filter media that do not have working examples in the '141 patent.

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[82] The '141 patent states "[n]o mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead." (JX-0022 at 26:60-65.). Respondents contended that this statement shows a disparagement and therefore non-enablement because the Federal Circuit held in *AK Steel Corp. v. Sollac and Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003) ("*AK Steel*") that enablement is not met when the specification "teaches against" and "discourages" part of the claimed invention. (RSBr. at 45 (citing *AK Steel Corp.* 344 F.3d at 1244).). In *AK Steel*, the specification stated that a certain silicon content caused coating problems, which the Federal Circuit interpreted as discouraging experimentation with coatings with that silicon content. *AK Steel*, 344 F.3d at 1244. However, a disparagement does not always lead to non-enablement. *Callicarate v. Wadsworth Mfg., Inc.*, 427 F.3d 1361, 1374 (Fed. Cir. 2005) (holding that "disparaging remarks . . . characterizing the prior art as less effective do not remove those disclosures as enabling references"). Unlike *AK Steel*, the specification here recites that the invention applies to other filter media types, including mixed-media filter types. (JX-0022 at 25:5-12, 26:30-37.). Therefore, although the '141 patent specification does not provide working examples in the specification, the specification specifically teaches mixed media as part of the invention.

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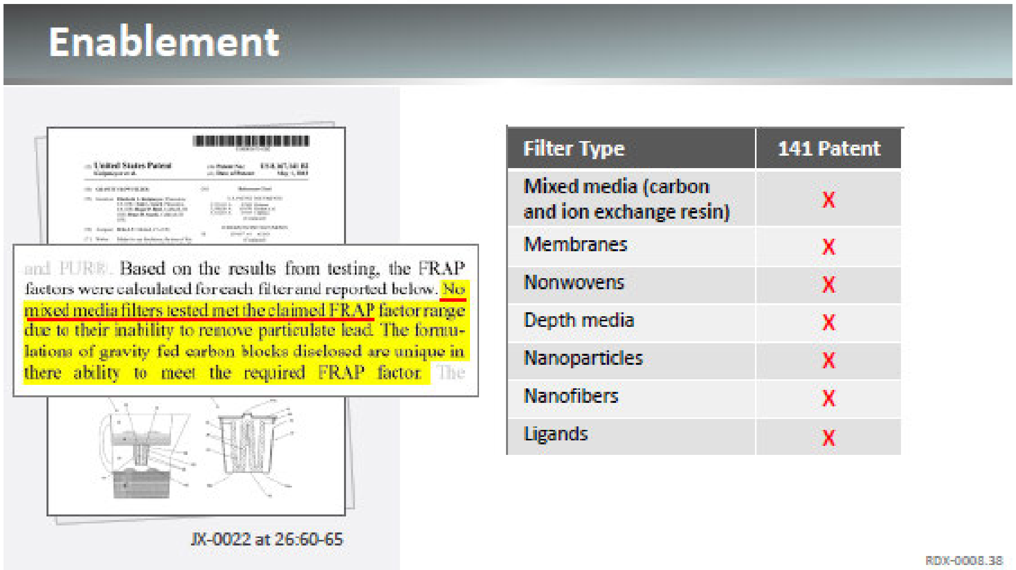
Figure No. 29: Working Examples Missing in the '141 patent



(RDX-0008.0038 (JX-0022 at 26:60-65, highlighting filter types with no working examples).).

On cross-examination, Dr. Freeman admitted that there are no working examples of filter media other than carbon block. (Tr. (Freeman) at 1561:16-19 ("My opinion is that the '141 patent disclosed carbon blocks in the working -- in the working examples, and then in the specification it also discloses other filter media").). Nonetheless, Dr. Freeman testified that a "routine" effort would extend the teaching of the '141 patent to other filter media types:

> Q. Okay. And I don't want to paraphrase, but if I understand, your opinion is, despite the patent not disclosing anything else, working examples of anything else other than carbon block, it would not really be a significant effort to go ahead and just design a mixed-media or a nonwoven filter that met the FRAP limitations of claim 1. Do I have that correct?
>
> A. Yes, sir, basically, using the teachings in the '141 patent, I believe a person of skill in the art would be able to extend that to other media formats.
>
> Q. And yes or no, Dr. Freeman, that wouldn't be a significant effort, according to your opinion, correct? That would be just routine.
>
> A. Yes, I believe that would be routine.

(Tr. (Freeman) at 1562:4-17.).

Brita was unable to rebut that the ’141 patent has no working examples for filter media other than carbon block. However, this is not a case where the specification provides no enabling disclosure. In *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997) (“*Genentech*”), the Federal Circuit explained that where there is no basic enabling disclosure, enablement cannot be found by relying on the skill in the art. *Genentech*, 108 F.3d at 1366. The novel aspects of the invention must be supplied in the specification, not by knowledge of the skilled artisan. *Id*.

Here, there is a basic enabling disclosure for carbon block water filters as shown by the working examples of carbon block water filters with specified FRAP factor values and FRAP variable values. (JX-0022 at Table 5, filters PA3-5, 3-8, 3-4, 3-6, 3-4 alternate housing, PT3-11, PT3-13, PT3-51, PT3-53; *see* Section XII(C)(3), *supra* (describing written description of working examples in the ’141 patent); Table No. 11, *supra* (Working Examples in Table 5 of the ’141 patent).).

Respondents argued that the novel aspect of the invention comprises creating filters with a FRAP under 350. (RSBr. at 44.). Respondents asserted that the novel aspect cannot be “foisted” upon a person of ordinary skill in the art “for other filter categories.” (*Id*.). Brita argued that a specification need not “describe how to make and use every possible variant of the claimed invention.” (CSRBr. at 22 (quoting *McRO II*, 959 F.3d at 1100).). An analysis of all of the *Wands* factors, rather than focusing on one factor, provides the better answer to these arguments.

Respondents had the burden of proof that the presence or absence of working examples favors a finding of undue experimentation. The evidence shows that there is a presence of

working examples for carbon block and granular carbon in the '141 patent, but the absence of working examples for filter media other than carbon block. Respondents had the better supported argument. Accordingly, *Wands* factor 3 favors a finding of fact and law that there would be undue experimentation to make the claimed invention.

d) *Wands* Factor 4 – The Nature of the Invention

Respondents argued that "the nature of the invention including the arbitrary nature of the claimed FRAP factor" supports a finding that there would be undue experimentation to reach the full scope of filters claimed in the '141 patent. (RPBr. at 116-17.). In their Supplemental Post-Hearing Brief, Respondents grouped their argument of *Wands* factors 4, 2, and 3 together (2, 6, and 7 in their brief, respectively), but did not provide either specific argument or evidence about the nature of the invention. (RSBr. at 52-53; *see* Section XII(D)(2)(b), *supra* (*Wands* Factor 2).).

Brita argued in its Pre-Hearing Brief that Dr. Hatch's Initial Report failed to provide a substantive analysis of the nature of the invention (*Wands* factor 4) to make and use the full scope of the asserted claims. (CPBr. at 121.). In Post-Hearing briefing, Brita argued that the field of water filtration, possible components of gravity-fed filters, filter media, and associated chemical and physical filtration processes were well-known, which reflect on the nature of the invention. (CSRBr. at 18-19.).

Dr. Hatch testified that carbon block filters were "the only nature of the invention that's shown" in the '141 patent. (Tr. (Hatch) 1438:20-23.). In contrast, Dr. Freeman testified that "the nature of the invention is gravity-fed water filters, and we've heard several times today that this is a well-known field and has been known for many decades if not longer." (Tr. (Freeman) at 1519:21-24.).

A patent sets forth the nature of the invention in the "Brief Summary of the Invention"

that precedes the detailed description of the invention. 37 C.F.R. § 1.73; MPEP § 608.01(d) (Brief Summary of the Invention). The ’141 patent explains in the “Summary of the Invention” that the invention is gravity-fed carbon block water filters, according to one embodiment, that satisfies certain FRAP factor values. (JX-0022 at 5:24-54.). In another embodiment, filter media comprises particles that are not bound together. (*Id.* at 7:20-21.). Moreover, the invention is not limited to exemplary embodiments. (*Id.* at 33:64-34:3.).

It is a factual finding that the nature of the invention is gravity-fed water filters including, according to one embodiment, carbon block filter media. The evidence does not clearly show that the nature of the invention either supports or does not support a finding of undue experimentation. Given that Respondents had the burden of proof, *Wands* factor 4 does not support a finding of undue experimentation.

e) *Wands* Factor 5 – The State of the Prior Art

Respondents argued *Wands* factors 5 and 6 together. (RPBr. at 116-17; RSBr. at 53-54.). Respondents contended that the state of the prior art and relative skill of those in the art supports undue experimentation to reach the full scope of the claimed invention. (RPBr. at 116-17.). In its Supplemental Post-Hearing Brief, Respondents acknowledged that a person of ordinary skill in the art would “know how to calculate the inputs to the FRAP equation” and “would also know about mixed-media filters, membrane filters, nonwoven filters, depth media filters, nanoparticle filters, nanofiber filters, and ligands filters.” (RSBr. at 53 (citing Tr. (Hatch) at 1434:16-1438:8, 1439:23-1440:21).).

Admitting this state of the art, Respondents argued that “the interrelationship of the inputs to the FRAP equation and the results of the FRAP equation are unpredictable.” (RSBr. at 53 (citing Tr. (Hatch) at 1435:21-1438:8, 1439:23-1440:21).). Respondents also argued that the

development of the Brita DI Products, the PUR Mario 3, and the ZeroWater filter confirm that "the state of the art was unpredictable." (RBr. at 99-100; RSBr. at 54.). Arguments about predictability are addressed with respect to *Wands* factor 7, below. (*See* Section XII(D)(2)(g), *infra*.).

Brita argued in its Pre-Hearing Brief that Dr. Hatch's Initial Report failed to provide substantive analysis or adequately account for the state of the prior art to make and use the full scope of the asserted claims. (CPBr. at 121.). In Post-Hearing briefing, Brita argued, with the extensive expert testimony from Dr. Freeman as well as admissions by Dr. Hatch, that the field of water filtration, possible components of gravity-fed filters, filter media, and associated chemical and physical filtration processes were well-known. (CSRBr. at 18-19 (citing (Tr. (Freeman) at 1489:7-11 (describing that the technology had been around for decades, if not generations), 1519:21-24 (describing gravity-fed water filters as "a well-known field and has been known for many decades if not longer"), 1520:7-12 (describing that "[t]here's a lot of literature, handbooks, patent literature that is available to help inform a person of skill in the art" in enablement); Tr. (Hatch) at 1461:16-19 (agreeing that there were a number of well-known filtration media materials used in gravity-fed water filters prior to the invention), 1462:15-25 (agreeing that activated carbon, ion exchange resins and physical barriers for filtering were well-known).).

As described above, Respondents acknowledged that the state of the art is developed in that a skilled artisan could calculate the FRAP factor variables and the filter media types were known. Brita argued in support of an advanced state of the art. As described more fully below, the evidence supports a finding that the state of the art is advanced.

The '141 patent describes that "[g]ravity flow filtration systems are well-known in the

art" and filter blocks "comprising granular activated carbon (GAC) and binder, with or without various additives such as lead sorbent [i.e., scavenger], have been commercially available for many years." (JX-0022 at 1:23, 1:66-2:2.). In addition, the "Background of the Invention" of the '141 patent describes particles, lead-reducing sorbents (i.e., lead scavengers), adjusting particle size, wall thickness, surface area, compression of the water filter, granular activated carbon, and drawbacks and concerns to overcome in filtration. (*Id.* at 2:38-42, 3:25-27, 4:20-52.).

In support of the state of the prior art, Dr. Knipmeyer testified that she used well-known testing methods for the '141 patent. (Tr. (Knipmeyer) at 168:8-21 (describing sampling as required under the NSF/ANSI standard), 169:7-20 (describing measuring effluent lead values in parts per billion), 188:12-22 (describing an automated rig to run challenge water through filters).). If Dr. Knipmeyer's Notebooks are evaluated, it is evident that she kept meticulous notes on a daily basis while working on what would become the '141 patent. (*See* Section XII(A)(1)(c), *supra* (Dr. Knipmeyer's Laboratory Notebooks).). Her notebooks recorded the results of experiments that were conducted repeatedly, in routine fashion. (*See* CX-0108C.).

Dr. Hatch agreed and testified that the state of the art prior to the invention was well-known. In other words, Dr. Hatch confirmed with Dr. Freeman that the other filters and processes were well-known, such as: (a) gravity-fed water filters; (b) chemical and physical filtration processes; (c) filtration media materials of activated carbon and ion exchange resins; (d) physical barrier to filter out particulate lead of a certain size, but not necessarily particulate lead; (e) nonwoven filter media; (f) depth-media filtration technique; (g) nanofibers filtration technique; (h) ligands filtration technique; (i) zeolites in gravity-fed filters; (j) to configure the foregoing types of media into a filter cartridge; and (k) gravity-fed water filter shape, size and

composition could be modified to achieve certain desired benefits such as faster flow rate or improved contaminant reduction. (Tr. (Hatch) at 1461:14-1462:21 (agreeing that gravity-fed water filters with activated carbon and ion exchange resins, and chemical and physical filtration were well-known), 1464:20-1465:5 (agreeing that physical barriers were well-known), 1465:18-1468:15 (agreeing that nonwovens, depth media, nanofibers, ligands, zeolites, configuration of media in a filter cartridge, configuration of shape and size, volume and composition of filter media to achieve faster flow rates or improved contaminate reduction were well-known); (Tr. (Freeman) at 1520:7-12.).).

Dr. Freeman corroborated Dr. Hatch's (and effectively Dr. Knipmeyer's) testimony by agreeing that "the state of the prior art . . . is very significant. . . . there's a lot of these sorts of filters available. There's a lot of literature, handbooks, patent literature that is available to help inform a person of skill in the art how to make and use the invention." (Tr. (Freeman) at 1520:7-12.). As explained below, Dr. Freeman testified and provided evidence to support Dr. Hatch's admission that the filter media or filtration techniques were well-known.

> Q. Were gravity-fed water filters considered a nascent technology prior to 2008?
>
> A. No. This technology has been around for decades, if not generations. It would have been one of the earliest ways that water filtration would have been accomplished.
>
> Q. And at the time of the invention, what types of filter media were known in the art?
>
> A. So there were a lot of types of filter media, things like nonwovens, there were the block filters, membrane filters, nanofiber filters, and several other mixed-media filters, several other classes of filters were well-known.

(*Id.* at 1489:7-18.).

Dr. Freeman opined that the art of water filtration was vast in that "there were a very, very large number of research articles in the scientific literature. There were handbooks and

books published on this topic." (*Id.* at 1491:7-17; CX-0842 (Handbook of Filter Media from 2002, including Chapter 8 on membrane filters); CX-0843 (Handbook of Nonwoven Filter Media from 2007); CX-0836 (*Polymer* article from 2004); Tr. (Freeman) 1495:21-1496:2 (explaining the *Polymer* article CX-0836 as describing nanofibrous, nonwoven mats made by electrospinning in filtration applications); RX-0631 (Rinker application published Jan. 5, 2006); Tr. (Freeman) at 1497:3-12 (explaining the Rinker application RX-0631 incorporated by reference in the '141 patent and discussing nonwoven filter sheets with porous carbon blocks); JX-0022 at 17:4-7; Tr. (Freeman) at 1498:15-23 (describing nanoparticles, nanofibers, ligands as well-known in filtration).).

Dr. Freeman opined that the "field was well developed. It was widely practiced. Moreover, there was an enormous amount of information that would be available to a person of skill in the art to assist them in filter design and filter making and then ultimately filter testing." (Tr. (Freeman) at 1499:3-7.).

Dr. Freeman testified that there are certain well-known principles or relationships that if the filter volume is reduced by half, then flow would increase through the filter. (Tr. (Freeman) at 1586:13-17; *see* Section V(B), *supra* (FRAP factor formula)). However, he explained that water with less contact time could provide less time for the lead scavenger remove soluble lead. (*Id*. at 1586:18-23.). As a result, the effluent lead concentration would increase. (*Id*. at 1586:22-23.). In addition, "it would reduce the capacity of the lead scavenger by half, which would potentially change the lifetime L." (*Id*. at 1586:23-25.). Dr. Freeman concluded that "a person of ordinary skill in the art would be aware of these relationships." (*Id*. at 1587:4-5.). To verify these relationships would require testing, but Dr. Freeman explained that:

> we teach the science of how the performance of particle beds and filter media like this, how the flow rate is affected by changes, like changing the volume of the filter

> bed, and we also teach how the variables like the amount of lead that could be taken up, how that would change. I taught this for 30 years in undergraduate chemical engineering. And a person of skill in the art would know the underlying science that would govern these relationships and would be able to apply that science to allow them to understand in general how these variables would change. And that background science provides a good intuition, and then you go into the laboratory and make the filter to ultimately determine its performance.

(*Id.* at 1588:22-1589:10.).

Even with the extensive literature and knowledge of water filtration, the inventors created a new factor, the FRAP factor. (*See* Section V(B), *supra* (FRAP factor formula).). There is no prior art with respect to the FRAP limitation for any range of FRAP factor values or for any filter media. (Tr. (Hatch) at 1434:9-15 (stating that the FRAP factor is not a routine or known measurement).).

Respondents have the burden of proof to prove that the state of the art does not support a finding of undue experimentation. However, the evidence supports a finding that the state of the art was advanced, which does not favor a finding under *Wands* factor 5 that there would be undue experimentation to make the claimed invention.

f) *Wands* Factor 6 – The Relative Skill of Those in the Art

Respondents argued that the state of the prior art and relative skill of those in the art supports undue experimentation to reach the full scope of the claimed invention. (RPBr. at 116-17.). Respondents argued that the state of the art and the skill of the art leads to unpredictability. (RSBr. at 53-54.). Nonetheless, Respondents failed to provide substantiated arguments about the skill of those in the art. Respondents' arguments about predictability are addressed in the next section. (*See* Section XII(D)(2)(g), *infra* (*Wands* factor 7).).

Brita argued in its Pre-Hearing Brief that Dr. Hatch's Initial Report failed to provide substantive analysis of the relative skill of those in the art (*Wands* factor 6) to make and use the

full scope of the asserted claims. (CPBr. at 121.). In Post-Hearing briefing, Brita argued that the field of water filtration, possible components of gravity-fed filters, filter media, associated chemical and physical filtration processes, and configuration of the filter cartridges were well-known. (CSRBr. at 9 (citing Tr. (Hatch) at 1466:13-17, 1465:7-1466:12, 1467:6-20).). Brita contended that a skilled artisan could configure the shape and size of the known filter media in filter cartridges. (CSRBr. at 19 (citing Tr. (Hatch) at 1467:13-20).).

Dr. Hatch did not offer an opinion on this individual *Wands* factor. However, he acknowledged that a person of skill in the art would know how to calculate the FRAP factor variables of volume **V**, average filtration unit time **f**, effluent lead concentration $\mathbf{c_e}$, and lifetime **L** if properly defined. (Tr. (Hatch) at 1434:18-1435:20.). Dr. Freeman opined that "a skilled artisan would have the skills to make and test filters that are described in the '141 patent." (Tr. (Freeman) at 1520:13-18).). Dr. Hatch, Dr. Freeman, and Dr. Knipmeyer all qualify of persons of skill in the art. (RSBr. at 53; *Markman* Order at 7.). There is no dispute that a skilled artisan would be able to test whether water filters meet the FRAP factor values of the asserted claims.

Respondents had the burden of proof that there would be undue experimentation to achieve the claimed invention. However, the evidence shows that the relative skill of a skilled artisan was advanced at the time the invention was made. Accordingly, *Wands* factor 6 weighs against a finding of fact that undue experimentation is required to make and use the claimed invention.

g) *Wands* Factor 7 – The Predictability of the Art

Respondents failed to argue about predictability in their Pre-Hearing Brief. (RPBr. at 114-17.). Brita also failed to directly argue in its Pre-Hearing Brief about unpredictability. (CPBr. at 121-23.). Thus, Brita and Respondents have abandoned, waived or withdrawn any

argument on this issue under Ground Rule 7.2.

Respondents had the burden of proof. However, since, neither of the Parties advanced argument or evidence (at least explicitly) on the *Wands* Factor 7, given the absence of evidence this factor is neutral when the totality of the evidence is weighed.

h) *Wands* Factor 8 – The Breadth of the Claims

In their Pre-Hearing Brief, Respondents argued that the ranges of FRAP factor values of claims 1-2, ranges of volumes in claims 3-4, the ranges of average filtration unit time values in claims 5-6, or the scope of filters alleged by Brita to be covered by the asserted claims are not enabled. (RPBr. at 114-17 (citing RX-0951C (Hatch Rep.) at ¶¶ 424-30); *see* Section XII(D)(2)(b), *supra* (*Wands* factor 2) (demonstratives illustrating the ranges of FRAP factor values, volumes, and average filtration unit time values that Respondents argued are not enabled).).

Respondents contended that the broad range of filter types is not enabled. (RPBr. at 116-17; RBr. at 94-96; RSBr. at 41-47.). Respondents asserted that the broad range of filter types is not enabled because the specification only discloses carbon block filters, disparages mixed media filters, would use trial and error, and requires gap-filling at the novel point of invention. (RSBr. at 41-44.).

Respondents argued that the '141 patent claims functional ranges of FRAP factor values, volume and average filtration unit time values that are broad and unbound are not enabled. (RSBr. at 47-51.).

In its Pre-Hearing Brief, Brita failed to directly argue about the breadth of the claims as to filter type, FRAP Factor values, or variables of the FRAP Factor. Brita argued that a specification need not explain every detail, and typically omits what is well-known. (CPBr. at

120 (citing *Wyeth*, 720 F.3d at 1384; *Cephalon*, 707 F.3d at 1338-39).). Brita argued that in his deposition testimony, Dr. Hatch ignored the express disclosures of the ’141 patent and failed to adequately account for the state of the prior art, and the knowledge and skill of a skilled artisan. (CPBr. at 120-21.).

In its Supplemental Reply Post-Hearing Brief, Brita contended that the breadth of the asserted claims is limited by the claimed: (a) activated carbon; (b) lead scavenger; (c) FRAP factor that interrelates variables to limit the variables themselves; and (d) FRAP factor values less than 350. (RSRBr. at 25 (citing Tr. (Freeman) at 1524:16-1525:1).). Brita argued the FRAP factor value and its variables are enabled and not unbounded because of inherent or reasonable boundaries. (CSRBr. at 26-30 (citing Tr. (Freeman) at 1515:16-1517:18, 1416:22-25 (explaining the FRAP variables of volume **V**, average filtration unit time **f**, lifetime **L,** effluent lead concentration $\mathbf{c_e}$ cannot be zero because a filter must have volume, filter at some rate, have a lifetime of some value to filter, and have some concentration of lead even if small and not detectable; Tr. (Hatch) at 1460:21-1461:13) (acknowledging that a volume **V** cannot be zero, average filtration unit time **f** cannot be zero, and therefore there is inherently some lower bound).).

The specification must provide “reasonable” enablement of the scope of the range. *Amgen*, 987 F.3d at 1085. “Reasonable” enablement arises when the specification “***teach[es] those skilled in the art*** how to make and use the full scope of the claimed invention without ‘undue experimentation.’” *McRO II*, 959 F.3d at 1100 (quoting *ALZA Corp. v. Andrx Pharm., LLC*, 603 F.3d 935, 940 (Fed. Cir. 2010) (emphasis added)).

i. FRAP Limitation Under 350

In evaluating the FRAP factor limitation for breadth, Dr. Hatch considered the datapoints

listed in Table 5 of the '141 patent, and observed that there are two datapoints for volume **V** and a range of average filtration unit time **f** values of 4.2-9.9 min/L. (Tr. (Hatch) at 1431:18-23, 1432:2-9.). Dr. Hatch opined that the specification describes flow rate examples down to 4.2 min/L, but that they are not enabled at some (ill-defined) value below 4.2 min/L because "once you start getting at that very, very low flow factor, which means a very, very high flow rate, in my opinion it would take undue experimentation to achieve a filter that would meet the very low end of this flow range with a very high flow rate." (*Id.* at 1432:2-9.).

Additionally, Dr. Hatch compared the missing ranges for volume **V**, average filtration unit time **f** values, and FRAP factor values, and opined "comparing the data that is presented shows such broad missing ranges that they just don't cover the full breadth of the claimed ranges." (Tr. (Hatch) at 1434:1-6.).

Dr. Freeman did not dispute that there are missing ranges for the FRAP factor values, volume **V** and average filtration unit time **f** values. However, Dr. Freeman explained that the breadth of the claims are not so large when considered in combination with the other claim limitations requiring activated carbon, lead scavenger, and a FRAP value:

> Q. . . . [H]ow do you believe breadth of claims factor weighs in terms of enablement of the patent claims?
>
> A. The claims are narrowed in the sense that they require activated carbon and lead scavenger, so that narrows them. They are also narrowed because they require this FRAP factor value of less than 350 . . . .
>
> * * *
>
> A. And those -- those grouping of [FRAP factor] variables are interrelated with one another in a way that further constrains the boundaries over which claim 1 applies, and I think that favors enablement.

(Tr. (Freeman) at 1524:16-1525:1.).

In other words, Dr. Hatch noted the gaps in the ranges of variables and opined that this

translates to non-enablement of the FRAP factor, while Dr. Freeman opined that the FRAP value of less than 350 constrains the boundaries of the interrelated variables such that the FRAP factor is enabled.

Dr. Hatch and Dr. Freeman did not contest that there are gaps in the ranges claimed. The issue is whether these gaps rise to non-enablement, especially for FRAP factor values less than 6.7.[83]

Respondents argued that "[w]hile functional claim language limitations are not necessarily precluded in claims that meet the enablement requirement, such limitations pose high hurdles in fulling the enablement requirement for claims with broad functional language." (RSBr. at 47 (quoting *Amgen*, 9987 F.3d at 1087).). Respondents asserted that the FRAP factor, FRAP variable of volume **V**, and FRAP factor variable of average filtration unit time **f** are broad functional claim limitations. (RSBr. at 47.). Respondents also asserted that the broad, unbound FRAP ranges, including the range of performance variables of the FRAP limitation, effluent lead concentration $\mathbf{c_e}$, lifetime **L**, and average filtration unit time **f**, are not enabled. (RSBr. at 47-48 (citing also *Auto. Techs. Int'l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1274 (Fed. Cir. 2007) ("*Auto Techs*"); *Certain Light-Emitting Diode Products*, Inv. No. 337-TA-1213, ID at 35 ("1213

[83] Respondents argued that the unbound ranges allow Brita to claim filters that have average filtration unit time **f** (flow rates) twice as fast, volumes **V** twice as small, lifetimes **L** three times longer, lead reduction $\mathbf{c_e}$ forty times better, and FRAP values three hundred times better than values disclosed in the '141 patent. (RSBr. at 30; RPBr. at 99-100.). However, Respondents ignore the state of the art, guidance provided in the specification, and the nature of the invention. The components of activated carbon and lead scavenger are well-known, as also admitted in the '141 patent. (*See* JX-0022 at 1:66-2:2). As Dr. Freeman testified, "because the components and raw materials that go into the filter are going to ***perform their function in any filter media*** that they're put into" that "***after some experimentation***, but not undue experimentation," comparable performance would be achieved. (Tr. (Freeman) at 1521:19-1522:1 (emphases added).). (*See* Section XII(D)(3), *infra* (an analysis of the *Wands* factors in totality).).

ID”)).).[84] [85]

In *Amgen*, the claims at issue were functionally broad because they claimed all antibodies having two functions: (1) binding to particular PCSK9 residues; and (2) blocking PCSK9 from binding to LDL receptors. *Amgen*, 987 F.3d at 1083.

Unlike *Amgen*, the asserted claims do not claim a function but rather, claim a mathematical formula, inter-related variables, and provide a performance result of a particular FRAP factor value. The FRAP factor itself embodies structure. (*See* Section XII(E), *infra* (35 U.S.C. 101).). Accordingly, here, the bar for enablement is not as high as in *Amgen* because the FRAP factor is not pure functional claiming.

Dr. Hatch opined that a person of ordinary skill in the art would not know how to achieve the very low end of FRAP values, i.e., a FRAP factor below 6.7. (Tr. (Hatch) at 1431:1-14.). Dr. Freeman disagreed and opined that a person of skill would know how activated carbon and lead scavenger influence the variables of the FRAP factor to meet the performance required in the asserted claims. (Tr. (Freeman) at 1524:16-1525:1.). Here, again, the views of the experts are directly opposed.

Respondents argued that Dr. Freeman was not sure whether a FRAP under 5 was possible given existing materials.[86] (CSBr. at 48 (citing Tr. (Freeman) at 1595:15-1596:14).).

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[84] Respondents argued that, like *Auto Techs*, Brita cannot “rely on entirely on the skill of one in the art to figure out how to create filter types.” (RSBr. at 45.). *Auto Techs* is distinguishable. In *Auto Techs*, the specification taught that side impact sensors were a new field. *Auto. Techs*, 501 F.3d at 1284. The specification extensively described electrical sensors, but not mechanical sensors. *Id*. at 1285. Here, however, water filtration and the filter media embodiments were well-known. A “patent need not teach, and preferably omits, what is well known in the art.” *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986). A full analysis of the *Wands* factors supports a finding of enablement.

[85] *See* n. 87 (addressing *Certain LED Products*).

[86] Respondents cited *Pernix Ireland Pain DAC v. Alvogen Malta Operations Ltd.*, 323 F. Supp. 3d 566,

> Q. As one skilled in the art at the time of the invention of the '141 patent, were filters having a FRAP of less or equal to 5 obtainable in the art?
>
> A. I don't know the -- I haven't seen a filter of less than 5 at the time that I was deposed. I've since come to learn that there are filters in this matter that go down to .02.

(Tr. (Freeman) at 1596:8-14.).

Respondents also argued that Dr. Knipmeyer's deposition testimony confirmed that she thought it was difficult to achieve FRAP values under 350. (CSBr. at 48-49 (citing RX-2607C (Knipmeyer Dep. Tr.) at 213:22-214:6).). Dr. Knipmeyer's testimony does not support Respondents' argument that she was not sure that FRAP factors under 3 were possible based on the disclosure of the '141 patent because she testified about a FRAP value of zero. (CSBr. at 49 (citing RX-2607C (Knipmeyer Dep. Tr.) at 227:15-20 ("Q. Would you agree with me a FRAP of zero is wholly unrealistic? . . . [A.] Yeah. I don't envision a place where you would have a FRAP of zero").).

Respondents then argued that claims encompassing ranges that were not possible as of the patent filing date are not enabled. (RSBr. at 49 (citing *MagSil Corp. v. Hitachi Global Storage Techs, Inc.*, 687 F.3d 1377, 1381 (Fed. Cir. 2012) ("*MagSil*"); *Intel Corp. v. Tela Innovations, Inc.*, 2021 WL 1222622 (N.D. Cal. Feb. 11, 2021)).). In *MagSil*, a claim limitation provided a lower bound for a change of resistance ("at least 10%"), and the disclosure had working examples which achieved at best 11.8%. *MagSil*, 687 F.3d at 1381. In 1995, a year

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575 (D. Del. 2018) ("*Pernix*"), *aff'd sub nom. Persion Pharms. LLC v. Alvogen Malta Operations Ltd.*, 945 F.3d 1184 (Fed. Cir. 2019), for the holding that "[g]iven that the testing results would be fundamental to determining which formulations would satisfy the asserted claims, it is apparent that, in the absence of such testing data, the inventors cannot be said to have possessed the full scope of the claimed invention." (RSBr. at 55 (citing *Pernix*, 323 F.Supp. at 628).). Respondents argued that "the fact that the inventors never created or tested" other embodiments of the '141 patent, supports a finding of lack of enablement and written description. (RSBr. at 55.). However, *Pernix* addresses the written description requirement only and not the enablement requirement.

after filing the application, the inventors could not achieve 20%; yet in 2008, a change of resistance of 604% was achieved. *Id*. at 1382. The Federal Circuit found that the field had advanced vastly after the filing of the application, and concluded that there was insufficient disclosure to achieve recent advancements. *Id*.

Here, Dr. Knipmeyer testified during her deposition that it was hard to achieve FRAP values lower than 350 in 2006. (RX-2607C (Knipmeyer Dep. Tr.) at 213:22-214:6.). Table 5 of the '141 patent describes a working example at a FRAP factor value of 6.7, two orders of magnitude lower than a FRAP factor value of 350. (JX-0022 at Table 5 (Filter "PT3-4 alternate housing").).

In contrast, Respondents argued that PUR's Mario 3 filter with "never-before-used combinations of ion exchange resins and nonwovens" and reduced effluent lead concentration **c_e** below 1 ppb encompasses performance "light year[s] beyond what the inventors" could create. (RSBr. at 47.). Although Respondents did not provide the FRAP factor for the Mario 3 filter, achieving a lead effluent concentration of less than 1 ppb is a significant improvement in the art. For comparison, Dr. Knipmeyer's notebooks reflect a lead effluent average concentration of 6.9 ppb, as shown in Figure No. 30 below.

Figure No. 30: Excerpt of Dr. Knipmeyer's Laboratory Notebook with Lead Testing Results of Formula PT3-4 Water Filter

PT3-4							
	3L	76L	151L	227L	273L	303L	average
Effluent	6.76	5.42	6.25	6.67	7.84	8.55	6.9
Filtered	0.7	4.97	5.82				
Influent	163.3	157.2	150	166.1	161.2	160.1	160
filtered influent	114.5	108.2	108.1	116	114.1	112.6	
1.2 filtered influent							
influent particulate %	29.9	31.2	27.9	30.2	29.2	29.7	30
% Total Pb Removed	95.9	96.6	95.8	96.0	95.1	94.7	
% Particulate Removed	87.6	99.1	99.0	86.7	83.4	82.0	
Rig Flow Rate (min)	0:05:19	0:04:31	0:04:29	0:03:39	0:03:36	0:03:37	0:04:13

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(CX-0108C.0122 (Excerpt from page 117 of Dr. Knipmeyer's laboratory notebook, notebook recordation date of August 16, 2006) (excerpt of lead testing results for water filter PT3-4).).

Accordingly, based on at least Dr. Knipmeyer's testing of a prototype in August 2006, the PUR Mario 3 product improves the effluent lead concentration compared to what was achievable in 2006, a reduction from about 7 ppb to 1 ppb.

Respondents also argued that the PUR Mario 3 uses mixed media and weak acid ion exchange that were disparaged by the '141 patent. (RSBr. at 47 (citing Tr. (Mitchell) at 763:24-765:12 (describing a new blend of three ion exchange resins with activated carbon)).). However, the '141 patent does not disparage as Respondents claimed. (*See* Section XII(C)(5)(a) (Written Description, Other Arguments).). In *ScriptPro*, the Federal Circuit explained that a description of an embodiment as "inconvenient" does not constitute "disparagement" when the same specification later also includes those "inconvenient aspects" as part of the invention. *ScriptPro*, 833 F.3d at 1341.

Here, the '141 patent also expressly states that "[t]he FRAP factor criteria set forth herein is applicable to all embodiments . . . including but not limited to mixed media (carbon and ion exchange resin), carbon blocks . . . ." (JX-0022 at 26:30-34.). Carbon and ion exchange resin comprise the media of the PUR Mario 3 product. (JX-0022 at 25:9-12.). Moreover, nonwovens in combination with carbon blocks are described as an embodiment of the '141 patent. (Tr. (Freeman) at 1497:3-12 (explaining the Rinker application RX-0631 (US 2006/0000763 A1, U.S. Application No. 10/881,517) incorporated by reference in the '141 patent (JX-0022 at 17:4-7) and discussing nonwoven filter sheets with porous carbon blocks).).

Although the PUR Mario 3 does have improved lead effluent concentration, the improvement is not as extreme as in *MagSil*, and the PUR Mario 3 uses filter media already described in the '141 patent. Accordingly, it is not clear that the holding in *MagSil* and the PUR

Mario 3 product support a finding of undue experimentation.

Respondents also argued that the testimony of Dr. Rockstraw supports a finding that the ’141 patent is not enabled. (RSBr. at 50.). Dr. Rockstraw testified that a filter meeting the requirements of claim 1 is not possible for a volume of 2 cm^3. (Tr. (Rockstraw) at 616:20-617:6.).

> Q. . . . And despite there being no volume limitations in claim 1 of the ’141 patent, your opinion, you agree with me, that it is not possible to have a filter with a filter media volume of 2 cubic centimeters and still meet claim 1 of the ’141 patent, correct?
>
> A. Yeah, I find that hard to understand how you can make a filter with a volume that small that would still meet the limitations of claim 1.
>
> Q. There’s no examples even in the patent that even come close to 2 cubic centimeters, are there, Dr. Rockstraw?
>
> A. I don’t recall seeing one around 2 cubic centimeters, no.

(*Id.*).

Dr. Rockstraw testified that a filter meeting the requirements of claim 1 is not possible for an **f** value of 0.45 min/L. (Tr. (Rockstraw) at 616:20-617:6; RPBr. at 114-15).

> Q. Your opinion, sir, is that 0.45 minutes per liter is a flow rate that could only be achieved by a pressurized system, not a gravity-fed system. Did I read the words of your signed expert report correctly?
>
> A. You read it correctly, yes.

(Tr. (Rockstraw) at 614:12-16.).

Thus, Respondents argued that for the same reasons as the volume **V** variable is not enabled, the average filtration unit time **f** variable is not enabled because the average filtration unit time **f** value of 0.45 min/L is not possible with gravity-flow water filters, according to Dr. Rockstraw. (RSBr. at 51.). In addition, Respondents argued that flow rates with no lower

boundary are not enabled. (*Id*. at 50-51.).[87]

The doctrine of inoperable embodiments applies here. The Federal Circuit has held that claims need not specifically exclude inoperable combinations. *Atlas Powder Co. v. E.I. du Pont De Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984); *see also CFMT, Inc. v. YieldUp Int'l Corp.*, 349 F.3d 1333, 1339 (Fed. Cir. 2003) ("the party asserting inoperability must show that all disclosed alternatives are inoperative or not enabled."). Here, although certain data points may not be operative, Respondents failed to meet their burden of proof of clear and convincing evidence that the FRAP factor, as a whole, is not enabled. Dr. Freeman's testimony was more complete and credible.

It is also clear that a volume and flow rate cannot be zero because a filter cannot work if it has no volume and does not filter at some rate. (Tr. (Hatch) at 1460:21-1461:13 (acknowledging that a volume **V** cannot be zero, average filtration unit time **f** cannot be zero, and therefore there is inherently some lower bound).). Therefore, a lower bound on volume and flow rate inherently exists at some value above zero. (*Id*.). The variables of the FRAP factor interrelate, and the claims are directed to filters that meet the FRAP factor and a combination of variables, not a particular value of a single variable.

Respondents' argument that certain values are not operable does not support a finding

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[87] Respondents argued that in *Certain LED Products* an efficiency was claimed without an upper bound, yet an expert admitted that a certain efficiency was not possible, and the full scope of the asserted claims was not enabled. (RSBr. at 50 (citing 1213 ID at 29-32).). The 1213 ID held that "[i]f part of a claimed range is not enabled, 'then the entire range is invalid.'" (*Id*. at 32 (quoting *Alcon Res.*, 687 F.3d at 1367-68).). Respondents argued that for the same reasons as in the 1213 ID, the asserted claims in this Investigation are not enabled, which Respondents said is illustrated by Dr. Rockstraw's testimony because 2 cm^3 is not possible, yet is within the claimed range. (RSBr. at 50.).

Unlike *Certain LED Products*, there are upper bounds on the FRAP factor. Additionally, dependent claims 3-6 provide upper bounds for the volume **V** and average filtration unit time **f** variables, which even Dr. Hatch acknowledged in his Hearing testimony. (Tr. (Hatch) at 1460:9-1461:13; JX-0022 at cls. 3-6.).

that there would be undue experimentation in order to make and use the invention at issue. Moreover, there is a finding of fact here that the FRAP factor is enabled.

ii. Filter Embodiments Other Than Carbon Block Filters

Respondents argued that the scope of the asserted claims are "exceedingly broad" because of the many types or species of water filters, carbon or lead scavenger available. (RSBr. at 51.). Respondents contended that there are hundreds (100s) of types of activated carbon. (RSBr. at 51 (citing Tr. (Freeman) at 1573:23-1574:8 (admitting there is "a lot of choice" in activated carbon)).). Respondents argued that there are dozens of types of lead scavenger. (RSBr. at 51-52 (citing Tr. (Freeman) at 1573:5-10 (answering that there are two working examples of lead scavengers in the '141 patent, but additional lead scavengers known in the art and also discussed in the '141 patent)).). Respondents asserted that:

> there are tens of thousands of possible filter species (8 x 12 x 100s) and structure that could meet the structural limitations of the '141 patent. Yet, as discussed throughout, the inventors had exactly one species of filter (carbon block), one size and kind of activated carbon, and two lead scavengers: a grand total of two working examples P-A and P-T.

(RSBr. at 52 (citing JX-0022 at Tables 1, 5).).

It is not disputed that the '141 patent discloses various filter media embodiments, various activated carbon, and lead scavengers. These are all in the prior art. (*See S*ection XII(D)(2)(e), *supra* (*Wands* factor 5) (explaining that filter media, carbon and lead scavenger are well-known).). Dr. Freeman testified that while the activated carbon and lead scavenger may take different forms, they are all expected to behave in the same manner in the filter media. (*Id*.). Accordingly, the argument that there are hundreds of activated carbon and dozens of lead scavenger fails to take into consideration the state of the art and the guidance provided in the specification of species that do work, as shown by the working examples. (*See* Sections

XII(D)(2)(b), (c), *supra* (*Wands* factors 2, 3) (explaining guidance provided in the specification, working examples). The claims are broad in that the filter media is not limited to carbon block in the asserted claims. However, it is not clear that this supports a finding of undue experimentation given the state of the art and the remaining *Wands* factors.

Respondents argued that Dr. Freeman's opinion that trial and error could fill the gap is not sufficient. (RSBr. at 42-43 (citing Tr. (Freeman) at 1575:19-1576:6; *Idenix*, 941 F.3d at 1163).). Dr. Freeman testified during his deposition, that:

> a person of ordinary skill in the art would come with a lot of background about performance of a prior mixed media. And seeing that the components were being used in the specification examples here gave FRAP factors and those geometries that are set forth gave the FRAP factors that -- that met the claim 1 limitation, a person of ordinary skill in the art could use that information, then, to pick, if you will, the needles out of the haystack of mixed media and other formats to be able to practice the invention.

(Tr. (Freeman) at 1575:19-1576:6 (repeating Dr. Freeman's deposition testimony).).

Dr. Freeman explained during the Hearing that he meant that "the haystack" is "the enormous amount of background information and performance about prior mixed-media" and "someone wanting to use the '141 patent could choose from [the haystack] the pieces that they need to make the inventive filters, that is, the '141 patent is only an incredibly small subset of what was known about mixed-media filters." (Tr. (Freeman) at 1646:2-10.).

In *Idenix*, the Federal Circuit concluded that to first synthesize candidate molecules, and then screen them for efficacy against HCV would require undue experimentation. *Idenix*, 941 F.3d at 1162. In contrast, here, the asserted claims already identify activated carbon and lead scavenger. The '141 patent identifies working examples that already incorporate activated carbon and lead scavenger. (*See* Section XII(D)(2)(c), *supra* (*Wands* factor 3) (identifying working examples).). Dr. Freeman testified that while the activated carbon and lead scavenger

may take different forms, they are all expected to behave in the same manner in the filter media. (Tr. (Freeman) at 1521:19-1522:1.). While the claims are broad in that the filter media is not limited to carbon block in the asserted claims, it is not clear that this supports a finding of undue experimentation given the state of the art and the remaining *Wands* factors.

Respondents argued that Dr. Knipmeyer acknowledged that creating non-carbon block embodiments would involve creating new technology. (RSBr. at 46 (citing (Tr. (Knipmeyer) at 327:15-328:6 ("I imagine that you could develop new technology that would -- that would meet that requirement" of the '141 patent)).). Brita counterargued that Dr. Knipmeyer simply explained that she herself had not created the other filter types.

In *Centrak*, an inventor's admission of not having working examples of all embodiments was not fatal to meeting the written description requirement because the nature and context of the invention was also considered. (*See* Section XII(C)(4)(b), *supra*.). Here, the remaining *Wands* factors, including that the state of the prior art recognizes that filter media other than carbon block were well-known, on balance, support enablement. (*See* Section XII(D)(3), *infra* (weighing *Wands* Factors).).

The scope of the claims are broad because the filter media is not limited to carbon block filters and FRAP factor values are limited to values of about 350 or less, or less than about 200. (JX-0022 at cls. 1-2.). Given that Dr. Hatch and Dr. Freeman have opposing views on enablement for FRAP factors values less than 6.7 and filter media other than carbon block, and Respondents have the burden of proof, the arguments including those about the PUR Mario 3 filter, inoperable embodiments, and unbound ranges, better support Brita. It is a finding of fact and law that Respondents did not meet their burden of proof with clear and convincing evidence. Accordingly, *Wands* factor 8 does not support a finding of undue experimentation.

3. Evidence on the *Wands* Factors Favors a Finding that the '141 Patent Is Enabled

An analysis of the relevant *Wands* factors favors a finding both of law, and by the facts that support the law, that that the full scope of all the asserted claims of the '141 patent are enabled. As discussed above, water filtration was well-known (*Wands* factor 5), those skilled in the art used established techniques and materials (*Wands* factor 6) such that the quantity of experimentation is not unreasonable (*Wands* factor 1). The specification provides sufficient guidance (*Wands* factor 2) to obtain the cited FRAP factor value. Although there is a lack of working examples for the full scope (*Wands* factor 3), this is not detrimental when weighed against the remaining factors. The claims are broad (*Wands* factor 8), but when taken in context of the remaining *Wands* factors, this factor alone does not outweigh the other factors to support a finding of undue experimentation.

For the above reasons, it is a finding that based on an analysis of the *Wands* factors and the totality of the weight of the evidence, that a person of skill in the art could practice the invention without undue experimentation to achieve: (i) the full scope of the FRAP factor; and (ii) carbon block filters and other types of filters, such as mixed media, membrane, nonwoven, depth media, nanoparticle, nanofiber or ligand filters.

Respondents did not prove by clear and convincing evidence that the claims of the '141 patent are not enabled. Accordingly, the asserted claims are not invalid for lack of enablement.

E. Patent Ineligible Subject Matter Under 35 U.S.C. § 101

Section 101 limits patent eligible subject matter to "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. Under Supreme Court precedent, "applications" of abstract concepts "to a new and useful end" remain patent eligible. *Alice Corp. Pty. v. CLS Bank Intern.*, 573 U.S. 208, 217 (2014)

("*Alice*") (citation omitted). Determining whether a claim is invalid for being directed to a patent-ineligible abstract idea involves a two-step analysis. The court first determines whether the claim is "directed to" an abstract idea, and second determines "whether the claim nonetheless includes an 'inventive concept' sufficient to '"transform the nature of the claim" into a patent-eligible application.'" *Yu v. Apple Inc.*, 1 F.4th 1040 (Fed. Cir. 2021) ("*Yu*") (citations omitted). "[F]eatures that are not claimed are *irrelevant* as to step 1 or step 2 of the *Mayo/Alice* analysis." *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 967 F.3d 1285, 1293 (Fed. Cir. 2020) ("*American Axle*") (emphasis added) (collecting cases).

1. The Claims of the '141 Patent Contain Structure and Are Patent Eligible

Respondents argued that the '141 patent claims are invalid under Section 101 because they are directed to an abstract idea and fail to recite a patent-eligible application of that abstract idea. (RPBr. at 117-121; RBr. at 100-16; RSBr. at 55-64.). Complainant disagreed. (CRBr. at 41-46; CSRBr. at 30-39.).

The *Alice* step one inquiry is to "determine whether the claims at issue are directed to a patent-ineligible concept." *Alice*, 573 U.S. at 217. The Federal Circuit explained that "[t]he 'directed to' inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether 'their character as a whole is directed to excluded subject matter.'" *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016).

Respondents argued that the asserted claims are directed to gravity-fed water filters that achieve a certain FRAP value, which Respondents contended is a result-oriented abstract idea. (RBr. at 100; RPBr. at 117.). Respondents contended:

> The '141 Patent's only independent claim—claim 1—clearly recites the invention in terms of a result: "filter media including at least activated carbon and a lead scavenger" that "***achieves*** a Filter Rate and Performance (FRAP) factor of about

350 or less . . . ."

(RBr. at 101 (citing JX-0022 at cl.1) (emphasis in Respondents' brief).).

Respondents contended that the asserted claims do not recite a particular means of "achieving" the claimed FRAP factor. (RBr. at 101.). Accordingly, Respondents argued that "the asserted claims are directed to an aspirational goal but lack limitations about how to achieve that goal" and are thus invalid under Section 101. (RBr. at 100-01.). Respondents argued that "claiming a tangible system does not impute immunity under § 101" and that the asserted claims are "directed to" a result and devoid of structure for achieving it. (RSBr. at 56.).

In support of their *Alice* step one argument about the abstraction of the '141 patent, Respondents cite to *Free Stream Media Corp. v. Alphonso Inc.*, 996 F.3d 1355, 1363 (Fed. Cir. 2021) ("*Free Stream*") which directs the analysis to "whether the claims in the patent focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery." (RBr. at 101 (citing *Free Stream* at 1363 (Fed. Cir. 2021) ("*Free Stream*") (quoting *McRO, Inc. v. Bandai Namco Games Am. Inc.,* 837 F.3d 1299, 1314 (Fed. Cir. 2016) ("*McRO I*")).). In *Free Stream*, the Federal Circuit found that the alleged technological improvement does "nothing more than implement a computer to achieve the abstract idea" and the claims merely improved the abstract idea of targeting advertising. *Free Stream*, 996 F.3d at 1365. The Federal Circuit also noted that while the claimed advance required a mobile device, one was not claimed, further supporting patent ineligibility. *Free Stream*, 996 F.3d at 1364 n.5. In *McRO I*, the claims were patent eligible as "focused on a specific asserted improvement in computer animation" where there was no evidence that the process previously used in animation was the same as the process claimed. *McRO I*, 837 F.3d at 1314.

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Respondents argued that the claims do not cite a particular means of "achieving" the FRAP factor, and claim 1 recites the invention in terms of a result. (RBr. at 102 (citing *Affinity Labs of Tex., LLC v. Amazonc.com Inc*., 838 F.3d 1266, 1269 (Fed. Cir. 2016) ("*Affinity Labs*") (finding claims describe no more than a desired function or outcome, and directed to "a network-based system with a customized user interface, in which the system delivers streaming content from a network-based resource" ineligible because "'customizing information based on…information known about the user' is an abstract idea")).). Respondents argued that the asserted claims are not limited to a specific structure and lack details about the filter, filter media, proportions, or weight, and "[a]ll that matters under the Asserted Claims is whether its result is ***achieved***." (RBr. at 103-04 (emphasis in original) (citing *Interval Licensing LLC v. AOL.*, 896 F.3d 1335, 1343 (Fed. Cir. 2018) (explaining that *Alice* and its progeny reaffirm that drafting claims in a result-oriented way such that they encompass a principle in the abstract, no matter how implemented, is not patent eligible)).).

Respondents also argued that the asserted claims are directed to the FRAP factor, but lack limitations about flow rate and lead reduction, two (2) goals of the invention. (RBr. at 104-05 (citing *Enfish LLC v. Microsoft Corp*., 822 F.3d 1327, 1335-36 (Fed. Cir. 2016) ("*Enfish*") (finding the claims were not directed to an abstract idea but to an improvement in how computers operate, embodied in a self-referential table different from conventional database structures); *accord Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1258 (Fed. Cir. 2017) (finding claims directed to an improved computer memory system and not to an abstract idea of categorical data storage).).

Yet, despite Respondents' attorney arguments, Dr. Hatch, Respondents' expert on water filtration and lead removal from water, did not offer an opinion on invalidity under Section 101

during the Hearing. (Tr. (Hatch) at 1410:9-1411:12.). Moreover, each of the cases to which Respondents cite, and particularly *Free Stream*, *Affinity Labs*, and *Enfish* are distinguishable because unlike in *Free Stream*, *Affinity Labs*, and *Enfish*, the '141 patent invention is not merely an improvement of a generic system.

In contrast to Respondents' argument about the abstract nature of the invention of the '141 patent, Brita's more persuasive argument under *Alice* step one is that the claims of the '141 patent are directed to manufactured articles that are physical, tangible things, and in this instance, filters and/or containers or pitchers with filters, and therefore, they are not abstract "ideas." (CPBr. at 109; CRBr. at 41.). Brita contended that the FRAP factor, which consists of four (4) variables described and discussed above in Section V.B., is "a way to describe a gravity-fed water filter in terms of the filter's physical properties and characteristics." (CRBr. at 42.).

As Brita noted, "the parameters of the FRAP factor were the means by which the inventors accomplished these two seemingly contradictory goals" of lead removal and flow rate. (CRBr. at 43 (citing Tr. (Knipmeyer) at 157:12-14; RX-2602C (Saaski Deposition) at 249:22-24 (stating a goal was to match flow rates similar to those already in the marketplace)).).

Dr. Benny Freeman, Brita's expert on invalidity, supported Brita's argument, without rebuttal from Dr. Hatch. Dr. Freeman noted what the structure of the invention is when he testified that "claim 1 starts out by calling out a gravity-fed water filter, and so that's a physical device, something that can be manufactured." (Tr. (Freeman) at 1527: 13-15.). Additionally, Dr. Freeman testified that in his opinion, the asserted claims of the '141 patent are not directed to a result, but to a physical article, and not "directed at just an idea." (Tr. (Freeman) at 1528:2-6.). Dr. Freeman then explains where structure is found, as discussed more fully below.

Dr. Freeman testified about the physical and tangible nature of the invention, and about

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the purpose of the FRAP factor in his testimony that the FRAP variables "provide structure to [the claimed] device." (Tr. (Freeman) at 1530:18-19.). Dr. Freeman testified as to how the filters denote structure:

> Q. What about the FRAP limitation in claim 1 denotes structure to a person of ordinary skill in the art?
>
> A. So the FRAP limitation really provides a compilation of key design and performance criteria that work together to give that FRAP value. So the volume of the filter media, and the filter media we've just discussed what it has to have in it, the filter media and the shape of the article ultimately determines the flow rate, the lifetime and the effluent lead concentration are intimately linked to one another. And so all of these variables provide structure to this device.
>
> Q. What about the effluent lead concentration at end of lifetime, how does that performance property relate to structure of a gravity-fed water filter?
>
> A. So the effluent lead concentration at the end of the lifetime is going to depend upon the nature of the components, the activated carbon and the lead scavenger, the amount of those components, their layout, the format size and shape of the filter. And it will also depend on the packing of those particles in the sense that that impacts the filtration unit time and, therefore, the contact time of the water with the components of the filter.

(Tr. (Freeman) at 1530:6-15.).

As Dr. Freeman observed, "by requiring a specific range of FRAP factors (i.e., about or below 350 or 200), the asserted claims recited specific configurations of gravity-fed filters to create technical improvement over the prior art." (CSRBr. at 32 (citing Tr. (Freeman) at 1528:11-19).).

Respondents contended that because the FRAP factor includes variables (e.g., average filtration unit time **f**, effluent lead concentration $\mathbf{c_e}$, and lifetime **L**) that are performance measurements, the claims are directed to a result. (RPBr. at 119-20; RBr. at 103.). Therefore, according to Respondents' argument, the FRAP factor reflects an abstract idea. However, even if the FRAP factor is considered an abstract idea, which it is not, the *Alice* step one inquiry is an

inquiry into whether the claim as a whole is directed to an abstract idea. *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900 at *5 (Fed. Cir. 2022) (examining eligibility at *Alice* step one by considering an independent claim as a whole and in view of the specification).

While the Supreme Court has recognized that "an important implicit exception" to patentability are: "Laws of nature, natural phenomena, and abstract ideas," or *Alice* step one, the Supreme Court also cautions lower tribunals to:

> tread carefully in construing this exclusionary principle lest it swallow all of patent law. At some level, "all inventions …embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." Thus, an invention is not rendered ineligible for patent simply because it involves an abstract concept. "[A]pplication[s] of such concepts "'to a new and useful end,'" we have said, remain eligible for patent protection.

Alice, 573 U.S. at 216-17 (citations omitted).

Therefore, even if Respondents' argument were supported, which it is not, simply reciting an abstract idea does not end the *Alice* step one inquiry. While a claim may recite an abstract idea, the Court explained, additional elements in the claim must "'transform the nature of the claim' into a patent-eligible application" of the abstract idea, or *Alice* step two. *Id.* at 216 (citations omitted). *See also RecogniCorp, LLC v. Nintendo Co.,* 855F.3d 1322, 1327 (Fed. Cir. 2017) ("Adding one abstract idea (math) to another abstract idea (encoding and decoding) does not render the claim non-abstract"); *Genetic Techs. v. Merial LLC,*818 F.3d 1369, 1376, 118 USPQ2d 1541, 1546 (Fed. Cir. 2016) (eligibility "cannot be furnished by the unpatentable law of nature (or natural phenomenon or abstract idea) itself.").

Respondents argued that activated carbon and lead scavenger are well-known, conventional structures. (RSBr. at 58-59.). However, these additional elements, that of activated carbon and a lead scavenger, are not required by the FRAP limitation but they do add additional structure and concrete measurements/limits to the '141 patent. (*See Markman* Order at 20-24

(construing lead scavenger as a component that removes or reduces lead from water, as understood by one of ordinary skill in the art); JX-0022 at 5:34-35.). Similarly, Respondents seemingly failed to rebut Dr. Knipmeyer's testimony with respect to the purpose of the properties that the activated carbon and lead scavenger add to the structure of the FRAP factor and the invention. (*See* Tr. (Knipmeyer) 158:14-17 (explaining "the volume goes to, the actual physical nature of the filter, the media, the part that's actively filtering and how much of it you have, and that impacts a lot of things about the performance and experience with the filter").

As what appears to be an attempt at undermining Dr. Knipmeyer's and Dr. Freeman's testimony, while ignoring properties that clearly add structure that belie Respondents' arguments, Respondents argued that the asserted claims do not recite these features and instead are directed to the abstract concept of achieving a FRAP value. (RBr. at 108.). Respondents contended that the specification describes an asserted advance as a particular configuration of multiple-core carbon blocks. (*Id*. at 109.). Relying on *Yu*, Respondents argued that the specification and the claims have a mismatch between the specification configurations/features and the asserted claims. (RBr. at 109 (citing *Yu,* 1 F.4th at 1045).).

In *Yu*, a claim that resulted in "producing a resultant digital image from said first image enhanced with said second image," was held to be directed to a result or effect that was itself an abstract idea. *Yu*, 1 F.4th at 1045. The practice of using pictures to enhance each other was well-known and used for over a century. *Id*. at 1043. The remaining limitations of the claims, sensors, lenses, circuity, memory, were conventional components set forth at a high degree of generality that performed only their basic functions. *Id*. The Federal Circuit explained that the specification described the unique configuration and advantages that hinged on a particular four-lens, four-image-sensor configuration. *Id*. at 1044. Representative claim 1, included only a

certain two-lens, two-image-sensor configuration, was broad in scope compared to the claimed advance described in the specification, resulting in a mismatch between claim 1 and the specification. *Id*. at 1044-45. The mismatch supported the holding that the claimed advance was an abstract idea, and not the particular configuration described in the specification. *Id*. at 1045.

As with other cases to which Respondents have cited, *Yu* is distinguishable. The mismatch between the specification and the claims in *Yu* resulted from a specification that described only a particular four-lens, four-image-sensor configuration, whereas the claims cited only a two-lens, two-image-sensor configuration without color-specificity. *Id*. However, as Brita correctly pointed out, claim 1 cites a FRAP factor that describes how the variables of volume, average filtration unit time, effluent lead concentration and lifetime characteristics are configured to obtain acceptable functioning of a water filter. (CRBr. at 44.). There is no 'mismatch' in how the specification and claim 1 describe the FRAP factor because they both describe a FRAP factor value of less than 350. (JX-0022 at (57) (abstract), cl.1.). Moreover, *Yu* is distinguishable because the '141 patent is not a digital, electronic application, but rather it describes physical products (filters) that are concrete articles of manufacture that have structure.

2. The '141 Invention Is Not Directed to Natural Law

As yet another interpretation of *Alice*, in *American Axle*, the Federal Circuit explained that "[s]ection 101 is concerned with whether the claims are directed to a natural law, not whether the specification has adequately described how to make and use the concretely claimed structures and steps." *American Axle*, 967 F.3d at 1302. The eligibility requirement "is that the claim itself . . . must go beyond stating a functional result; it must identify 'how' that functional result is achieved by limiting the claim scope to structures specified at some level of concreteness, in the case of a product claim." *Id*.

Here, some of the constituents of the filters that perform the invention, that add to the specificity of the ’141 patent, are the volume and composition of the filter media, which a skilled artisan can fine-tune to the desired application. (*Markman* Order at 8-14 (construing volume as plain and ordinary meaning, i.e., quantity of the filter media in cubic units, as understood by one of ordinary skill in the art), 20-24 (construing lead scavenger as a component that removes or reduces lead from water, as understood by one of ordinary skill in the art); JX-0022 at 5:34-35, 46.).

Although Respondents contended that claim 1 is directed to a result, and is therefore invalid under *Alice* step one, (RBr. at 101-102.), Respondents ignored all of the other concrete features of the ’141 patent that teach how the filter would work in order to eliminate certain harmful particulates, even though it is also true that the ’141 patent provides concrete testing limitations that are a means to insure that filters perform consistent with the terms of the ’141 patent.

A recent Commission majority opinion and dissent show how fraught the *Alice* step one analysis can be. The majority opinion in *Certain Polycrystalline Diamond Compacts and Articles Containing the Same*, Inv. No. 337-TA-1236, Comm’n Op. (Oct. 26, 2022) (“*Certain Polycrystalline Diamond Compacts*”), held that claims directed to performance measures were patent ineligible. The Commission noted that:

> the ID observed that the asserted claims “recite compositions of matter that are not found in nature,” but they also recite “certain structural and design features (for example, a particular grain size and a catalyst), performance measures (G-Ratio . . . and thermal stability . . .), and side effects (the various electrical and magnetic parameters).”

Id. at 19-20 (quoting Initial Determination at 102, 104; citing Initial Determination at 100, 134 (Mar. 3, 2022) (“1236 ID”)).

The Commission found that “the concept of stronger PDCs that achieve performance

measures and desired magnetic and electrical properties is an abstract idea for the purposes of *Alice* step one." *Certain Polycrystalline Diamond Compacts,* Comm'n Op. at 24. The 1236 ID stated that the G_{ratio} and thermal stability were performance measurements, specifically of wear resistance and thermal properties. *Id*. at 25; 1236 ID at 102. The 1236 ID found that the claim reflected an abstract goal of certain performance measures, however achieved, rather than by structure. 1236 ID at 105 (citing *Light-Emitting Diodes* at 21).

The electrical conductivity was found in the 1236 ID to be an "indirect measure of the effectiveness of other design choice and manufacturing variables." 1236 ID at 103. The electrical conductivity was not "a desirable feature as such; it is just a result of other desirable features." *Id*. The Commission held that the claimed electrical and magnetic properties were not proven to be indicative of any specific microstructure, and agreed with the 1236 ID that the recitation of a particular range of electrical conductivity appeared to be "gratuitous rather than inventive." *Certain Polycrystalline Diamond Compacts* Comm'n Op. at 26; 1236 ID at 104.

Certain Polycrystalline Diamond Compacts is distinguishable. In the '141 patent, the FRAP factor, while in part a physical measurement, also includes performance measures of lifetime (gallons filterable over the life of the filter), filterability by time (min/L), and ability to reduce the amount of lead in effluent water (concentration). In the '141 patent, the FRAP factor variables together represent how a filter that limits or eliminates certain dangerous particulates *functions* and does not merely include performance results. Moreover, the concept of the '141 patent is not based on laws of nature such as magnetic forces or electricity as was the case in *Certain Polycrystalline Diamond Compacts*. (JX-0022 at cl.1 (citing lead effluent level).).

Here, also, unlike in *Certain Polycrystalline Diamond Compacts,* the inventors state that "[g]ravity flow filtration systems are well known in the art." (JX-0022 at 1:53.). Moreover,

"granular activated carbon (GAC) … and lead sorbent, have been commercially available for many years." (*Id*. at 1:66-2:2; *see also* Tr. (Freeman) 1499:3-7 ("The field was well developed. It was widely practiced. And there was an enormous amount of information that would be available to a person of skill in the art to assist them in filter design and filter making and then ultimately filter testing.").).

Therefore, the microstructure or processing parameters of the PDCs in *Certain Polycrystalline Diamond Compacts* are not the same or even analogous to the FRAP factor limitation because of the "enormous" amount of information about these areas already available to the person having ordinary skill in the art. Unlike in *Certain Polycrystalline Diamond Compacts,* in which there was a search for electrical conductivity as a proxy for microstructure, design choice or manufacturing variables, claim 1 of the '141 patent recites concrete structures of activated carbon, lead scavenger and other variables as limited by the values that satisfy the FRAP factor having a value less than 350. (JX-0022 at cl. 1.).

For this Investigation, the dissent in *Certain Polycrystalline Diamond Compacts* applies. *See Certain Polycrystalline Diamond Compacts* Comm'n Op. (Commissioner Schmidtlein, dissenting or "Dissent" or "Dissenting Opinion"). Commissioner Schmidtlein took issue with the majority opinion ("Opinion") because:

> the "problematic" results and effects which the ID identifies (*i.e.*, the measurements of PDC properties) are not the sort of results Federal Circuit caselaw has called into question. Rather, the specifications (and other record evidence) indicate that they are measurements that reflect structure of a composition of matter. When the claim elements are considered as a whole, I do not believe that any of the asserted claims are directed to an abstract idea.

Id. at 11-12.

Here, the structure and purpose of the '141 patent, and the appropriate analysis, are more in line with the Dissent in *Certain Polycrystalline Diamond Compacts.* The Dissent pointed out

that it was undisputed that the claimed properties are associated with the PCD structure. *Id*. at 13. The Dissent explained:

> [l]abeling certain claim elements as "performance standards," "results" …, in my view, fails to appreciate that the claimed parameters are concrete, objective measurements for defining the invention and which reflect the diamond microstructures. Many properties of patented materials could be described the same way.

Id. at 12.

As Commissioner Schmidtlein reasoned in her Dissent, many properties, choice of inputs, processing parameters, and finishing steps could also be described as "performance standards," "results" etc. The claimed PDC was a composition of matter based on "what it is," and that it "results" from other design choices did not render it abstract. *Id*. Commissioner Schmidtlein also argued that a manufactured composition of matter is historically patent eligible, and that the Opinion failed to identify a case in which a composition of matter is ineligible as an abstract idea. *Id.* at 14-15 (citing *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09 (1980); *Diamond v. Diehr*, 450 U.S. 175 at 184 n.8 (1980); *Nat. Alternatives Int'l Inc. v. Creative Compounds LLC*, 918 F.3d 1338, 1347-49 (Fed. Cir. 2019)).

The Dissent also takes issue with the Opinion for citing *Alice* and *Yu* to argue that "the fact that asserted claims involve physical phenomena is 'beside the point.'" *Certain Polycrystalline Diamond Compacts* Comm'n Op. at 16 (Commissioner Schmidtlein, dissenting). The Dissent explained that "beside the point" was taken from a computer context, using generic computers, and applying methods in the tangible world. *Id*. But applying cases that involve abstract steps performed on generic computer components did not, in the Dissent's view, support a finding that the improved PDC, a composition of matter, to be abstract. *Id*.

Finally, the FRAP factor that is quoted verbatim in Section V(B), above, is a

mathematical formula with recognized variables that lend structure to the manner in which the invented object ostensibly should perform based on testing and specific measurements of particulates.[88] (CSRBr. at 31.). For example, it is clear that the volume variable, **V**, of the FRAP factor, reflects a physical characteristic, i.e., the volume of the filter media. As another example of structure and measurement, claim 3 of the '141 patent limits the volume of the filter media to less than 300 cm^3. (JX-0022 at cl. 3.).

In sum, it is a finding that under *Alice* step one, the '141 patent is directed to a patent eligible statutory class of invention, i.e., an article of manufacture. 35 U.S.C. § 101; *Chakrabarty,* 447 U.S. at 308-09. By labeling the FRAP factor in the '141 patent as a "result," Respondents arguments failed to appreciate that the water filter that is part of the invention is defined by its structure of activated carbon and lead scavenger, while it is also characterized by a combination of FRAP variables. For the reasons explained, Respondents have not proven by clear and convincing evidence that the claims of the '141 patent are directed to an abstract idea

[88] Neither Respondents nor Brita argued that the FRAP factor is, as is apparent on its face, a mathematical formula. Mathematical formulas can be patent eligible when there is an inventive application of the formula. As the Supreme Court explained, "Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely, the discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application." *Parker v. Flook*, 437 U.S. 584, 594 (1978) (limiting an abstract idea to a certain technological environment does not make it patentable). For similar reasons that an analysis of *Alice* shows the claims are patent eligible, so too are they eligible under a mathematical formula analysis because the formula has an inventive application as a water filter. In *Diamond v. Diehr*, the use of a well-known mathematical equation was patent eligible in the context of a claim for curing rubber. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981). In contrast here, the FRAP Factor is not well-known, but is the novel feature of the invention. The individual components, such as volume **V**, are well-known, but as a whole, the FRAP factor does not embody a well-known law of physics because the variables are interrelated so that varying one variable leads to variations in others. (Tr. (Hatch) at 1437:12-18.). For example, in practice, doubling one variable does not double the FRAP factor because other variables also change depending on the interrelationship of the water filter, activated carbon and lead scavenger. (Tr. (Knipmeyer) at 219:7-11.).

under *Alice* step one.

3. The '141 Patent Claims Are Valid Under *Alice* Step Two

If the claims of the '141 patent are deemed directed to an abstract idea and held to be invalid for the purposes of *Alice* step one, nonetheless, the claims are valid at *Alice* step two because the asserted claims recite additional elements that amount to significantly more than the abstract idea. *Alice*, 573 U.S. at 217–18.

As Brita persuasively argued, at *Alice* step two, the asserted claims embody an inventive concept that render the claims patent eligible because they constitute: "an arrangement of specific physical and performance characteristics of water filters that had never been commercially executed in the industry before." (CSRBr. at 30 (citing *EcoServices, LLC v. Certified Aviation Servs., LLC*, 830 Fed. Appx. 634, 641 (Fed. Cir. 2020) ("*EcoServices*"); JX-0022-0043-44 at 26:67-27:2, 0047 at 33:15-63).). In *EcoServices*, the patent claims were directed to a specific combination of units and detectors, configured in a certain way to create improvements to jet engine washing systems. *EcoServices*, 830 Fed. Appx. at 643. The system itself was new, and automation alone was not necessarily abstract. *Id.* at 645. At *Alice* step one, the Federal Circuit considered the claims in their entirety, and concluded that "their character as a whole" was not directed to an abstract idea. *Id*. at 645 (citing *McRO I*, 837 F.3d at 1312 (citing *Internet Patents Corp. v. Active Network, Inc*., 790 F.3d 1343, 1346 (Fed. Cir. 2015))). Here, the FRAP factor is new and embodies a new arrangement of physical structures/elements and performance variables. (*See* Section XII(E)(1), *supra* (discussing how the FRAP factor denotes structure).).

Respondents repeated the same arguments for step two of *Alice* as they did for step one of *Alice*, i.e., that the asserted claims, collectively, do not include a structure beyond "a generic

environment in which to carry out the abstract idea." (RBr. at 111 (quoting *Yu*, 1 F.4th at 1043).). Respondents contended that the recited activated carbon and lead scavenger are cited at a high level of generality, and the asserted claims contain no structure to obtain the FRAP factor limitation of less than 350. (*Id*. at 111-12 (citing *Yu*, 1 F.4th at 1045).).

In *Yu*, at *Alice* step two, the claimed hardware configuration was found to be a generic hardware limitation that served as a conduit for the abstract idea, which was the enhancement of one image by another image. *Yu*, 1 F.4th at 1045. But unlike in *Yu,* where a digital, electronic application is predictable, generic and conventional, the '141 patent cites chemical compounds of activated carbon and lead scavenger in combination with a FRAP factor. Together the claim limitations embody something more than an alleged abstract idea of the FRAP factor because the filter media and FRAP factor all interrelate: the volume *V* of filter media in the FRAP factor interrelates with the limitation of activated carbon and lead scavenger, in combination with the other claimed variables to obtain a FRAP value, and the results are performative and structural and not abstract. (*See* Tr. (Knipmeyer) at 158:14-17.).

Finally, as a last attempt to persuade that the '141 patent is ineligible for patent protection under Section 101, Respondents argued that preemption supports the finding of ineligibility. (RPBr. at 121; RBr. at 113; RSBr. at 63-64; Tr. (Freeman) at 1530:16-1531:7.). The *Alice* court explained that a concern driving the exception to patent eligibility is preemption. *Alice*, 573 U.S. at 216. (citing *Bilski v. Kappos*, 561 U.S. 593, 611-12 (2010) (upholding the patent "would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea").

Recognizing that laws of nature, natural phenomena, and abstract ideas are "the basic tools of scientific and technological work[,]" the *Alice* court explained that "monopolization of

those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it," thereby thwarting the primary object of the patent laws. *Alice*, 573 U.S. at 216 (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013), *Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc.*, 566 U.S. 66, 71 (2012) ("*Mayo*")). The *Alice* court explained the "concern that patent law not inhibit further discovery by improperly tying up the future use of" these building blocks of human ingenuity. *Alice*, 573 U.S. at 216 (quoting *Mayo,* 569 U.S. at 71 (citing *Morse, supra,* at 113)).

Thus, *Alice* step two can be considered a "preemption" analysis, wherein a tribunal distinguishes patents as "building blocks of human ingenuity" from patents that "integrate the building blocks into something more." *Money Suite Co. v. 21st Century Ins. & Fin. Servs., Inc.*, No. CV 13-1747-GMS, 2015 WL 436160, at *4 (D. Del. Jan. 27, 2015) (citing *Alice*, 573 U.S. at 517). In other words, overly broad patents that claim laws of nature, natural phenomena, and abstract ideas may improperly limit or preempt the use of those laws of nature, natural phenomena, and abstract ideas by others, such as in commercial applications.[89]

While preemption is a concern, and the Federal Circuit explained that limiting patentable scope may restrict preemption, and "it is not the policy of patent law to permit only narrow claims when an inventor has made a new, broad invention. When an invention is new and unobvious and described and enabled, commensurate patent rights are not barred on policy grounds." *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1353 (Fed. Cir. 2016).

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[89] The Federal Circuit has explained that preemption as a public policy grounds to find ineligibility under Section 101 is not sufficient where claims meet the statutory requirements of written description, enablement, novelty and non-obviousness. *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d, 1353 (Fed. Cir. 2016).

Here, Respondents argued that "the '141 Patent unduly preempts commercially viable gravity-fed water filters certified under NSF/ANSI Standard 53 for lead reduction – no matter the technology or physical characteristic." (RBr. at 114-15 (citing Tr. (Robert Vernon Herman) at 1027:10-1028:5).). Mr. Herman, an expert witness who testified for the Respondents, testified that in his opinion, any commercially viable product would meet the FRAP equation. (Tr. (Herman) at 1027:10-1028:5 (stating that "I don't think a commercially viable product would be – that would pass NSF Standard 53, especially current versions, and not end up FRAPPing, that meeting the FRAP equation").). In other words, according to Mr. Herman, any water filter on the market meeting lead requirements under the NSF standard would be preempted by the '141 patent.

In response to Mr. Herman's testimony, Brita argued that preemption is not a concern because "a filter does not have to have a FRAP under 350 to be compliant with the NSF/ANSI 53 standard." (CRBr. at 45.). In other words, filters can be designed around the '141 patent. Brita's expert, Dr. Freeman, explained that a filter "with a larger volume and a filter with a slow flow rate, and those filters could fall outside the FRAP range but still satisfy the NSF standard on effluent lead concentration." (CSRBr. at 37-38 (citing (Tr. (Freeman) 1531:1-7.).

Respondents counter-argued that Dr. Freeman's opinion failed to include examples of filters that would not be preempted by the '141 patent. (RSBr. at 57, 63.). Respondents contended that filters that Dr. Freeman suggested would not be commercially viable. (RSRBr. at 63.). For example, Respondents argued that very large volumes **V** or low average filtration unit rate **f** to obtain a FRAP over 350 are not a viable options for countertop water pitchers nor would they provide filtration at a satisfactory rate for consumers. (RSBr. at 63-64 (citing Tr. (Lauren Kahn) at 291:17-292:4 (stating that consumers typically want to fill up water pitchers quickly).).

In support of Respondents' argument that large containers are not viable options, Respondents cited the expert report of Dr. Rockstraw in which he opined that a ZeroWater product would need a volume of 8,500 cm^3 to achieve a FRAP factor over 350, or a volume of 4,900 cm^3 to achieve a FRAP factor over 200. (RSBr. at 63 (citing RX-1040C.0131-.132.).

Commercial viability is not a test in patent law under Title 35, which includes 35 U.S.C. § 101. *CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003) (examining enablement as not requiring success in the commercial marketplace; "Title 35 does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment absent a claim limitation to that effect."). Brita correctly pointed out that while desirable, there is a lack of proof that small filtration water volumes, fast flow rates, good lead reduction, or long lifetimes are requirements for commercial viability. (CSRBr. at 38.). There is insufficient evidence that water filters would be unduly preempted by the '141 patent because of commercial viability.

Respondents argued that Commission precedent with respect to a claim directed to a lighting device in *Light Emitting Diode Products* support invalidity of the '141 patent under Section 101. (RBr. at 115-16 (citing *Certain Light-Emitting Diode Products, Fixtures, and Components Thereof*, Inv. No. 337-TA-1213, Initial Determination (Aug.17, 2021) ("*Certain LED Products"*).). In *Light Emitting Diode Products*, Respondents pointed out that the abstract goal of lighting efficiency, the recitation of generic structure, and the unbound nature of the claim, gave rise to preemption and supported that the claims were directed to an abstract idea. (RBr. at 116 (citing *Certain LED Products*, ID at 28).). Because "[c]laims 1 and 11 read on *all* lighting devices with solid state emitters, however achieved, with wall plug efficiencies above 85 and 110 LPW" there was a threat of undue preemption. *Id*. at 120.

Respondents also argued that Commission precedent with respect to a method claim at issue in *Variable Speed Wind Turbine Generators* supports invalidity of the '141 patent under Section 101. (RBr. at 115-16 (citing *Certain Variable Speed Wind Turbine Generators and Components Thereof*, Inv. No. 337-TA-1218, Initial Determination at 118-23 (Sept. 10, 2021) ("*Variable Speed Wind Turbine Generators*").). In *Variable Speed Wind Turbine Generators,* a method claim failed at *Alice* step two because "its method steps are defined solely by the results they achieve." *Id*. at 121. The abstract idea was implemented by a generic control system, such that there was no patent eligible application of the abstract idea. *Id*.

Unlike in *Certain LED Products* and *Variable Speed Wind Turbine Generators*, the gravity-fed water filters at issue here use an arrangement of structure as embodied by the combination of activated carbon, lead scavenger, and physical and performance features as defined by the FRAP factor. (JX-0022 at cl.1.). The properties and the FRAP Factor of the '141 patent, transform an abstract idea into something more, supporting eligibility under *Alice* step two.

For all of the reasons described, under 35 U.S.C. § 101, the argument for and evidence of preemption are not sufficient to find ineligibility under *Alice* step two or more generally under 35 U.S.C. § 101. Respondents have not proven by clear and convincing evidence that the asserted claims of the '141 patent are invalid under 35 U.S.C. § 101.

XIII. ECONOMIC PRONG OF THE DOMESTIC INDUSTRY REQUIREMENT

A. Legal Standard

The Commission may only find a violation of Section 337 "if an industry in the United States relating to the articles protected by the patent . . . exists or is in the process of being established." 19 U.S.C. § 1337(a)(2) (emphases added). Typically, a complainant must show

that a domestic industry existed at the time the complaint was filed. *See Motiva LLC v. Int'l Trade Comm'n*, 716 F.3d 596, 601 n.6 (Fed. Cir. 2013).

The domestic industry requirement consists of a "technical prong" and an "economic prong." *See, e.g.*, *Certain Elec. Devices, Including Wireless Commc'n Devices, Portable Music & Data Processing Devices, & Tablet Computs.*, Inv. No. 337-TA-794, Order No. 88, 2012 WL 2484219, at *3 (June 6, 2012); *Certain Unified Commc'ns Sys., Prods. Used with Such Sys., and Components Thereof*, Inv. No. 337-TA-598, Order No. 9 at 2 (Sept. 5, 2007) ("*Communications Systems*"). A complainant satisfies the "technical prong" of the domestic industry requirement when it proves that its activities relate to an article "protected by the patent." *See Communications Systems*, Order No. 9 at 2. A complainant satisfies the "economic prong" of the domestic industry requirement when it demonstrates that the economic activities set forth in subsections (A), (B), and/or (C) of Section 337(a)(3) have taken place or are taking place with respect to the protected articles. *See id.*

Subsection 337(a)(3) states that:

> (3) For purposes of paragraph (2), and industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned –
>
> (A) significant investment in plant and equipment;
> (B) significant employment of labor, or capital; or
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3).

Because the criteria are listed in the disjunctive, satisfaction of any one of them will be sufficient to meet the economic prong of the domestic industry requirement. *Certain Integrated Circuits, Chipsets and Prods. Containing Same*, Inv. No. 337-TA-428, Order No. 10, Initial

Determination (May 4, 2000) ("*Integrated Circuits*") (unreviewed). Establishment of the "economic prong" is not dependent on any "minimum monetary expenditure" and there is no need for a complainant "to define the industry itself in absolute mathematical terms." *Certain Stringed Musical Instruments and Components Thereof*, Inv. No. 337-TA-586, Comm'n Op. at 25-26 (May 16, 2008) ("*Stringed Instruments*"). However, a complainant must substantiate the nature and the significance of its activities with respect to the articles protected by the patent at issue. *Certain Printing and Imaging Devices and Components Thereof*, Inv. No. 337-TA-690, Comm'n Op. at 30 (Feb. 17, 2011) ("*Imaging Devices*").

The Commission has interpreted Sections 337(a)(3)(A) and (B) to concern "investments in plant and equipment and labor and capital with respect to the ***articles*** protected by the patent." *Certain Ground Fault Circuit Interrupters and Prods. Containing Same,* Inv. No. 337-TA-739, 2012 WL 2394435, at *50, Comm'n Op. at 78 (June 8, 2012) ("*Circuit Interrupters*") (emphasis in original) (quoting 19 U.S.C. §§ 1337(a)(3)(A), (B)).

When a complainant proceeds under Section 337(a)(3)(C), it is not sufficient for the "substantial investment" under subsection (C) to merely relate to articles protected by the asserted patents. Rather, "the complainant must establish that there is a nexus between the claimed investment and asserted patent regardless of whether the domestic- industry showing is based on licensing, engineering, research and development." *Certain Integrated Circuit Chips & Prods. Containing*, Inv. No. 337-TA-845, Final Initial Determination, 2013 WL 3463385, at *14 (June 7, 2013).

In addition, the Commission has definitively stated that investments in plant and equipment or labor and capital that relate to engineering and research and development ("R&D") (that are expressly identified under subsection (C)), are properly considered under subsections

(A) and (B):

> The statutory text of section 337 does not limit sections 337(a)(3)(A) and (B) to investments related to manufacturing or any other type of industry. It only requires that the domestic investments in plant and equipment, and employment of labor or capital be "with respect to the articles protected by the patent." 19 U.S.C. § 1337(a)(3). Moreover, even though subsection (C) expressly identifies "engineering" and "research and development" as exemplary investments in the "exploitation" of the patent, that language does not unambiguously narrow subsections (A) and (B) to exclude those same types of investments.

Certain Solid State Storage Drives, Stacked Elecs. Components, and Prods. Containing Same, Inv. No. 337-TA-1097, Comm'n Op. at 8 (June 29, 2018) ("*Storage Drives*"); *see also, e.g.*, *Certain Marine Sonar Imaging Devices, Including Downscan and Sidescan Devices, Prods. Containing the Same, and Components Thereof*, Inv. No. 337-TA-921, Comm'n Op. at 57-64 (Jan. 6, 2016) ("*Sonar Imaging Devices*").

There is no mathematical threshold test or a "rigid formula" for determining whether a domestic industry exists. *Certain Male Prophylactic Devices, Inc*., Inv. No. 337-TA-292, Comm'n Op. at 39, USITC Pub. 2390 (June 1991) ("*Male Prophylactic Devices*"). However, to determine whether investments are "significant" or "substantial," the actual amounts of a complainant's investments or a quantitative analysis must be performed. *Lelo Inc. v. Int'l Trade Comm'n*, 786 F.3d 879, 883-84 (Fed. Cir. 2015) ("*Lelo*"). Even after *Lelo*, which requires some quantification of a complainant's investments, there is still no bright line as to a threshold amount that might satisfy an economic industry requirement.

It is the complainant's burden to show by a preponderance of evidence that each prong of the domestic industry requirement is satisfied. *Certain Prods. Containing Interactive Program Guide and Parental Control Tech.*, Inv. No. 337-TA-845, Final Initial Determination, 2013 WL 3463385, at *14 (June 7, 2013.). Moreover, the Commission makes its determination by "an examination of the facts in each investigation, the article of commerce, and the realities of the

marketplace." *Male Prophylactic Devices*, Comm'n Op. at 39 (quoting *Certain Double Sided-Floppy Disk Drives and Components Thereof*, Inv. No. 337-TA-215, Comm'n Op. at 17, USITC Pub. 1859 (May 1986)). "Commission precedent permits complainants to present evidence of their U.S. investments using methods and approaches that are appropriate to the facts of a particular investigation; such methods and approaches may include a comparison between complainant's domestic investments to the complainant's foreign investments to inform the contextual analysis for determining whether the claimed domestic investments are significant or substantial." *Certain Movable Barrier Operator Sys. and Components Thereof*, Inv. No. 337-TA-1118, Comm'n Op. at 23 (Jan. 12, 2021) (internal citations omitted) ("*Movable Barrier Operator Systems*").

In addition, as the Commission explained, it has looked to several different "contextual indicators" to determine if a complainant's investments and expenditures are sufficient to constitute a domestic industry. *See Certain Bone Cements, Components Thereof and Prods. Containing the Same*, Inv. No. 337-TA-1153, Comm'n Op. at 26 (Jan. 25, 2021) ("*Bone Cements*"). The Commission stated:

> For instance, one methodological approach the Commission has used in both pre- and post-1988 investigations is "comparing complainant's domestic expenditures to its foreign expenditures." Another approach, among others, is to consider "the value added to the article in the United States by the domestic activities." Indeed, Commission decisions have accepted a "value-added" analysis to assess whether an industry in the United States exists. Moreover, the Federal Circuit in *Schaper* compared the investments in the United States with "the total production process of [the domestic industry products]," and found that there was not "significant value added" to the products in the United States. In sum, as discussed above, the Commission's determination as to the existence of a domestic industry must be assessed according to a highly fact-specific assessment of the "nature and significance" of the complainant's domestic activities.

Id. at 26-27 (internal citations omitted).

B. Economic Prong Overview

Brita has proven with documentary and the testimonial support of its expert, Mr. Philip Green,[90] and its primary fact witnesses, Mr. Joel Ramirez[91] and Mr. Barrillon, that it meets the economic prong requirement of the domestic industry requirement ("economic prong"). (CBr: at 2 (citing Tr. (Rockstraw) at 510:6-10, 510:23-511:3; CX-0031C (LongLast+ packaging); CX-0020.0003 (LongLast+ photographs); CDX-0008C; Tr. (Green) at 705:3-6; Tr. (Ramirez) at 626:2-4; CBr. at 76-77.). The weight of the largely uncontested evidence is that Brita has satisfied the economic prong for plant and equipment under 1337(a)(3)(A), and for labor and capital under 1337(a)(3)(B). (Compl. at Confidential Exs. 51, 102, 103, 130; CPBr. at 2, 73; *see also* CDX-0010C (with cited exhibits omitted here).).

Brita has invested some [redacted] in its domestic industry since it first started manufacturing its LongLast gravity-fed filters [redacted] (Tr. at 66:19-20; CDX-0010C.0009; CX-0044C-0047C; CX-0049C (other cited exhibits omitted)). While not an especially large investment numerically, and because the Commission has not adopted either a "bright line rule," or even a minimally quantifiable percentage or minimal investment amount, nonetheless, Brita's

[90] When he testified during the Hearing as Brita's expert on the economic prong of the domestic industry requirement, Philip Green was a Principal in the firm of Hoffman Alvary & Co., LLC. Mr. Green holds an MBA in accounting. Mr. Green is a Certified Public Accountant and a Certified Management Accountant. He is a member of The American Society of Appraisers and of The American Institute of Certified Public Accountants. (CX-0366; CDX-0010C.0002). Mr. Green testified on Brita's domestic industry, including the economic prong of the domestic industry requirement. He also testified on remedy and bond.

[91] When he testified during the Hearing on August 18, 2022, Mr. Joel Ramirez was the former Associate Director of Finance for Brita, LP. Mr. Ramirez testified on the financial records Brita kept in the ordinary course of business with respect to its cost of goods sold, facility and manufacturing investments in DI Products and in the sales of the same. (*See* Confidential Ex. 102 to Compl.).

direct investments in its LongLast and LongLast+ DI Products, together with those of its [redacted], are sufficient to qualify as a significant domestic industry since they all relate to the patents at issue. *See Lelo*, 786 F.3d at 855; *Certain Carburetors and Prods. Containing Such Carburetors,* Inv. No. 337-TA-586, Comm'n Op. at 25-26 (May 16, 2008); *see also Stringed Musical Instruments*, Inv. N37-TA-586, Comm'n Op., 2009 WL 5134139, at *16 (Dec. 2009.). Commission precedent holds that a complainant may rely upon a licensee for its investments. *Certain Solid State Storage Drives, Stacked Electronics Components, and Products Containing Same* ("*Solid State Storage Drives*"), Inv No. 337-TA-1097, Comm'n Op. at 1, 6-10 (June 29, 2018.).

Brita provided substantiated evidence that it conducts research and development ("R&D") for its DI Products in [redacted] (CPBr. at 135; CB at 73.). According to Brita, its own [redacted] (CBr. at 77 (citing Tr. (Ramirez) at 626:13-23 (citations omitted)).

[redacted] (CPBr. at 136; CBr. at 77; Tr. (Barrillon) at 236-37; Confidential Ex. 6 to Compl ([redacted]).).

[redacted]

[redacted]. (CBr. at 77; Tr. (Barrillon) at 432:18.). [redacted] (CBr. at 77.).

However, there are [redacted]. (CBr. at 77; Tr. (Barrillon) at 436:24-437:2.). According to Brita, [redacted]. (CPBr. at 135; CBr. at 77, 78.). As with reliance on a licensee, it is well-established that domestic activities/investments of a complainant's subcontractor may be considered for purposes of domestic industry. *Certain Male Prophylactic Devices*, Inv. No. 337-TA-546, Comm'n Op. at 39 (Aug. 1, 2007).

According to Mr. Barrillon's testimony, [redacted]. (CBr. at 78 (citing Tr. (Barrillon) at 436:24-437:2).). [redacted] (CBr. at 78 (citing Tr. (Barrillon) at 437:9-13).). [redacted]. (CBr. at 77 (citing Tr. (Barrillon) at 434:25-435:18; CX-0253C ([redacted]).).

Brita's investments are in products protected by the '141 patent at issue, its LongLast and LongLast+ gravity-fed filters. *See Certain Television Sets, Television Receivers, Television Tunes, and Components Thereof*, Inv. No. 337-TA-910, Comm'n Op. at 68 2015 WL 6755093, at *36 (Oct. 30, 2015.); *see also* Tr. (Green) at 709:4-11.).

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C. Sales-based Allocation

In order to arrive at the total investments for Brita's LongLast and LongLast+ (rebranded as "Elite") filters, i.e., Brita's domestic DI Products, Brita and its expert, Mr. Green, used a sales-based allocation. (Tr. (Green) at 678:23-680:15; CPX-0060C; CX-0176C ([redacted] allocating based on sales). [redacted] (*See* CDX-0010C.0015; CX-0044C; CX-0176C; CX-0370C.). "A complainant is not obligated to use a particular allocation methodology." *Certain High-Density Fiber Optic Equip. & Components Thereof*, Inv. No. 337-TA-1194, Commission Op. at 65 (Aug. 23, 2021). An allocation methodology may be appropriate to a complainant's circumstances "as supported by evidence in the record." *Certain Mobile Device Holders*, Inv. No. 337-TA-1028, Comm'n Op. at 18 (Mar. 22, 2018). A sales-based allocation is an acceptable method for calculation of DI investments and "need not provide a "precise accounting" so long as the allocations are reasonable under the circumstances. *Movable Barrier Operator Systems*, Comm'n Op. at 28.

D. Contextual Analysis of Value Added: COGS: Global Manufacturing Context

Brita argued that its U.S. R&D and manufacturing activities ([redacted]) that are related to the DI Products each add value to the LongLast and LongLast+ DI Products. As Brita argued, and as a finding here, Brita's investments in R&D and manufacturing activities are significant in context. (CBr. at 84-85). *Certain Batteries and Electrochemical Devices Containing Composite Separators, Components Thereof, and Prods. Containing Same*, Inv. No. 337-TA-1087, Order

No. 32 at 4-5 (Aug. 8, 2018) (citation omitted), *aff'd as modified on other grounds* by Notice, 2018 WL 4331965 (Sept. 7, 2018); *see also Bone Cements*, Comm'n Op. at 26.

[redacted] (CBr. at 85 (citing Tr. (Ramirez) at 625:10-20, 656:12-657:6, 704:18-705-10) ([redacted]).). [redacted] In sum, by offering comparisons from a domestic value-add perspective and also comparisons to its overseas manufacturing investments, Brita has demonstrated the significance of the value added to its domestic investments. (*See* CDX-0010C.0033-41; *see also* Tr. (Barrillon) at 657:11-659:3.).

For example, from a revenue perspective, Brita noted that between [redacted]. (CDX-0010C.0059 (citations omitted)). Brita's total net revenues from the sales of all of its products during that same time frame totaled [redacted]. (*Id.*). On average for all those years, Brita's net revenues from the sales of its LongLast filters were [redacted] on average of its total net revenues.

Brita also observed that much of Dr. Thomas Vander Veen's testimony was directed to Brita's methodology and quibbled with the value-added analysis that Brita and its expert, Mr. Green, conducted.[92] However, Dr. Vander Veen's analyses do not persuade against a finding that Brita has established a domestic industry.

As part of its contextual analysis, consistent with *Bone Cements*, Brita estimated that the

[92] When he testified during the Hearing, Dr. Thomas Vander Veen was Managing Director of Epsilon Economics, Chicago. According to his C.V. (Ex. 4 to RPSt.), Dr. Vander Veen is an expert, *inter alia*, in applying economics to intellectual property, international trade and complex disputes. Dr. Vander Veen was called by Respondents to provide his analysis and opinions on Brita's economic domestic industry, and on remedy and bond.

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[redacted] (RX-0918C.0001 (Green Report Exhibits J-1); *see also* CDX-0010C.0033-37; CX-0060C). Dr. Vander Veen contended initially that the value added was only [redacted] but then during the Hearing, acknowledged that the valued added of the Brita filter and system together amounted to at best, a [redacted],” but their own expert’s testimony at the Hearing contradicts that assertion. (Tr. (Vander Veen at 1252:19-1253:11 (opining that there is [redacted] value-add for the LongLast filters and [redacted] domestic value add for the systems). Moreover, both Brita and Respondents’ experts agree that about [redacted] of Brita’s overall cost of goods for a LongLast filter relates to [redacted]. (Tr. (Green) at 694:2-5; Tr. (Vander Veen) at 1299:15-20.).

[redacted] (CBr. at 87 (citing Tr. (Barrillon) at 434:25-435:18; *id*. at 437:9-13.). Brita also compared its U.S. COGS to Global COGs and the percentage that the DI Products represent. (*See generally* CDX-0010C.0001-44 and exhibits cited, and specifically CDX-0010C.0035-44.). While Dr. Vander Veen contested that exact figure that the COGS represent that are attributable to Brita’s domestic manufacturing, he agreed with Brita that approximately [redacted] of Brita’s overall cost of goods for its DI Products relate to [redacted]. (*See* CDX-0010C.0037 (showing [redacted] of total cost of goods; CDX-0010C.0036 (Showing [redacted] based on CPX-0060C; *see also* CDX-0016C.0006; Tr. (Green) at 694:2-5 and Tr. (Vander Veen) at 1299:15-20 (agreeing that [redacted]).).

Dr. Vander Veen did not dispute that without its LongLast filters, which are assembled in the United States, Brita would not be able to commercialize its DI Products since the LongLast+ filters also depend upon the LongLast filters. (CBr. at 74 (citing Tr. (Vander Veen at 1286:3-20).). Moreover, [redacted] to Brita's filter housing and pitchers. (Tr. (Ramirez) at 625:21-626-12.).

Dr. Vander Veen testified that it would be a better approach to assess 'significance' by "compar[ing] cost to cost or revenue to revenue." (*See* CBr. at 87 (citing Tr. (Vander Veen) at 1299:4-11 (discussing CDX-0016C); *see also* CX-0252C ([redacted]); Tr. (Green) at 689:18-690:12.). However, as Brita noted, even with this approach, [redacted]. (Tr. (Vander Veen) at 1295:22-1296:2.). Moreover, [redacted] for each LongLast system, which includes a filter and pitcher. (*Id.* at 1296:7-11.). Using Dr. Vander Veen's approach of comparing revenue to revenue shows that [redacted] total revenue per filter and system. (Id. at 1298:5-17.). Even if Dr. Vander Veen's comparison methods are adopted, they too show that there is a significant value added to Brita's DI Products. (CBr. at 88.).

However, as Brita noted, notwithstanding Dr. Vander Veen's critique of Brita's "value added" analysis, Dr. Vander Veen also agreed that [redacted] in order to have filters to sell. (CBr. at 74 (citing (Tr.) Vander Veen at 1289:12-24.)). In sum, the significance of Brita's expenditures in the U.S. is apparent when compared against foreign expenditures, as reflected even in the analysis of Brita's COGS. *See, e.g.*, *Certain Plant-Derived Recombinant Human Serum Albumens ("rHSA") and Prods. Containing Same*, Inv. No. 337-TA-1238, Initial Determination at 106 (April 7, 2022).

While Respondents have argued that Brita is a "mere importer," that argument must be dispelled and dismissed. Dr. Vander Veen did not offer an opinion on that issue. (*See* CPBr. at 1; *see also* Tr. (Vander Veen) at 1314:3-6 (no opinion on Brita's "mere importer" argument). Since Respondents did not offer evidence or opinion on that issue, they waived or abandoned that issue under Ground Rule 10.1. Moreover, Brita's comparisons between its domestic and foreign investments, whether it uses COGS to COGS approach or a revenue to revenue approach, still reflect as a matter of fact that Brita's investments in context are significant.

E. Brita's Investments Under 1337(a)(3)(A): Plant and Equipment

Respondents' expert, Dr. Vander Veen, did not dispute the amount of Brita's [redacted]. Brita and [redacted] combined investments in plant and equipment for Brita's DI Products from [redacted]. (*See* CDX-0010C.0013 (other exhibits cited, omitted here).). Given the context of the investments, they are significant. The investments include [redacted]. (CBr. at 79 (citing CDX-0010C.0010-12; *see also* (Tr. (Green) at 674:14-675:22; CX-0249C (other citations omitted).). The investments include some [redacted]. (Tr. (Green) at 673:5-9.).

Table No. 13: Brita's Total DI Investment for Plant and Equipment from FY 2016 to First Half of FY 2022

Type of Investment	Amount ($)
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

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[redacted]	[redacted]

(CDX-0010C.0031 (Green) (other exhibit citations omitted).).

As reflected in Table No. 13 above, [redacted]. (CBr. at 79 (citing Tr. (Barrillon) at 674:14-675:22; CX-0237C ([redacted]); CX-0249C; CX-0247C; CDX-0010C.0001 (Photographs of [redacted]); *see also* CX-0238C; CX-0240C; CX-0245C; CX-0237C; CX-0268C; CX-0247C; CX-0249C; CX-0378C.).

From [redacted]. (CDX-0010C.0015 (citing CX-0050C; CX-0181C, CX-0373C; CX-0376C; CPX-0025C; CPX-0065C.). That investment is only the amount that Brita allocated to the DI Products from total investments of [redacted] during the years mentioned, with different allocation percentages ascribed to the DI Products for each year, i.e., [redacted]. (CDX-0010C.0015 (citing CX-0050C; CX-0181C; CX-0373-0376C; CPX-0025C; CPX-0065C.).

However, the allocation percentage that Brita used to calculate [redacted] square feet of the total. (Tr. (Green) at 675:24-676:3; Tr. (Ramirez) at 633:3-634:24; CPX-0059C; CX-0144C (other citations omitted).). [redacted] (*See* Tr. (Green) at 676:9-12.). This expense was further allocated based on Mr. Ramirez's explanation that [redacted]. (*Id.* at 676:13-

677:5; Tr. (Ramirez) at 633:25-635:6, 635:20-636:4 (explaining the [redacted]).). The total investment in the [redacted]. (Tr. (Green) at 677:17-20; *see also* CDX-0010C.0013-15 (showing exhibit evidence pertaining to same).).

The final investment in [redacted] that is shown in Table No. 13 for Brita's [redacted] in the ordinary course of business. (Tr. (Green) at 680:16-681:5, 678:23-680:15; CPX-0060C; CX-0176C ([redacted]).). Again, Brita argued that a sales-based allocation factor is also appropriate to apply here because Brita considers its [redacted] (Tr. (Ramirez) at 630:19-631:12 (noting that a [redacted]); *see also* CPX-0063C; CX-0179C [redacted]; CDX-0010C.0016-19 (demonstrating evidence pertaining to same).

F. Brita's Investments Under 1337(a)(3)(B): Labor and Capital

Brita and [redacted] combined investments in labor and capital for Brita's DI Products from [redacted]. (*See* CDX-0010C.0031 (other exhibits omitted here.). Given the context of the investments as described above, Brita's labor and capital investments are significant. (CBr. at 80-81.).

Brita's investments, as reflected in Table No. 14, below, include [redacted]

[redacted]. (Tr. (Green) at 687:15-688:1; Tr. (Ramirez) at 637:13-638:7 (explaining how [redacted]).).

Table No. 14: Brita's Total DI Investment for Labor and Capital FY-2016-First Half of FY 2022

Type of Investment	Amount of Spending ($)
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

(CDX-0010C (Green) (other exhibits cited omitted).).

As Table No. 14 reflects, Brita's direct investments in labor and capital with [redacted]. According to Brita's evidence, [redacted]. (Tr. (Green) at 681:24-682:5; Tr. (Barrillon) at 440:2-11.). [redacted] (Tr. (Green) at 682:6-13.). [redacted] (*Id.* at 682:14-21); Tr. (Barrillon) at 440:2-17 (explaining that [redacted]); CX-0251C and CPX-0074C ([redacted]); *see also* Tr.

(Barrillon) at 440:2-24 (explanation that [redacted]; Tr. (Green at 682:14-683:2).).

Another category of Brita's labor and capital investments, shown in Table 14, above, are Brita's R&D expenditures in labor and capital of about [redacted]. (Tr. (Green) at 683:5-684:22). According to Brita, these investments include Brita R&D's expenditures in salaries and benefits for employees on the [redacted] (CBr. at 82 (citing Tr. (Ramirez) at 651:1-653:17).).

Brita's Contact Center support is described above. The remaining categories of Brita's capital and labor expenditures (i.e., [redacted] (Tr. (Green) at 684:23-686:5.) They do not duplicate Brita's other recorded capital and labor investments as shown in Table 14. (*Id.*). In sum, it is a finding that Brita's own direct investments in labor and capital, together with those of [redacted], are significant.

XIV. RECOMMENDATION ON REMEDY AND BOND

In the event of a finding of violation of Section 337, Brita has requested that the Commission issue a limited exclusion order ("LEO") and cease and desist orders ("CDOs"). (CPBr. at 146-48; CBr. at 93-96.). Brita also has requested that the Commission impose a bond of at least 100% of the entered value during the Presidential Review Period ("PRP"). (CPBr. at 148-50; CBr. at 96-99.).

This decision recommends: (1) Limited Exclusion Orders with a certification provision against the PUR, ZeroWater, and LifeStraw Respondents; (2) Cease and Desist Orders against the PUR and LifeStraw Respondents; (3) and that a 100% bond of the entered value be imposed during the PRP on the PUR and ZeroWater Respondents; and (ii) a bond rate of $6 per unit be imposed during the PRP on the LifeStraw Respondent.

A. Legal Standard

Pursuant to Commission Rule 210.42, an ALJ must issue a recommended determination on: (i) an appropriate remedy if the Commission finds a violation of Section 337, and (ii) an amount, if any, of the bond to be posted. 19 C.F.R. § 210.42(a)(1)(ii). When a Section 337 violation has been found, as here, "the Commission has the authority to enter an exclusion order, a cease and desist order, or both." *Certain Flash Memory Circuits and Prods. Containing the Same*, Inv. No. 337-TA-382, Comm'n Opinion on the Issues Under Review and on Remedy, the Public Interest and Bonding, at 26 (June 9, 1997). The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. *Viscofan, S.A. v. U.S. Int 'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986).

When a violation of Section 337 is found, the Commission may issue either a limited exclusion order ("LEO"), directed against products manufactured by or on behalf of named parties found in violation, or a GEO, directed against all infringing products. *See* 19 U.S.C. § 1337(d).

Additionally, a CDO is appropriate where the evidence demonstrates the presence of commercially significant inventory in the United States. 19 U.S.C. § 1337(f); *see also Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, Comm'n Opinion, USITC Pub. No. 2391, 1991 WL 790061 at *30-32 (June 1991).

Infringing articles may enter upon the payment of a bond during the sixty-day Presidential Review Period. 19 U.S.C. § 1337(j)(3). The bond is to be set at a level sufficient to "offset any competitive advantage resulting from the unfair method of competition or unfair act enjoyed by persons benefiting from the importation." *Certain Dynamic Random Access Memories, Components Thereof and Prods. Containing Same*, Inv. No. 337- TA-242, Comm'n Opinion, 1987 WL 450856 at 37 (Sept. 21, 1987).

B. Limited Exclusion Orders Against the PUR, ZeroWater, and LifeStraw Respondents Are Warranted

This decision finds a violation of Section 337 based on infringement of the '141 patent by the PUR, ZeroWater, and LifeStraw Respondents. Therefore, the issuance of LEOs against these Respondents are warranted. *See* 19 U.S.C. § 1337(d) ("If the Commission determines, as a result of an investigation under this section, that there is a violation of this section, it shall direct that the articles concerned, imported by any person violating the provision of this section, be excluded from entry into the United States . . . .").

ZeroWater argued that any limited exclusion order the Commission issues should name Zero Technologies LLC ("Zero Technologies") only and not Culligan International Co. ("Culligan"). (RRBr. at 28.). However, a Culligan employee, Mr. Judd Larned, confirmed that Zero Technologies is a business unit under Culligan and 100% owned by Culligan.[93] (*See* CX-0693C (Larned Dep. Tr.) at 15:21-22, 16:14-16.). "[I]t is not Commission practice to insulate parent companies from the unfair importation, sale for importation, or sale after importation acts of their subsidiaries or affiliates." *Certain Access Control Systems and Components Thereof*,

[93] At the time of his deposition on May 6, 2022, Mr. Judd Larned was employed by Culligan International. (CX-0693C (Larned Dep. Tr.) at 10:6-7.). He was the President of Culligan Water, a business unit of Culligan International. (CX-0693C (Larned Dep. Tr.) at 10:8-15.).

Inv. No. 337-TA-1016, Final ID at 24 (Oct. 23, 2017), *unreviewed in pertinent part* by 83 Fed. Reg. 13517-19 (Mar. 29, 2018) (finding that each Respondent satisfied the importation requirement and noting that if parent companies were insulated from the unfair importation "it would be incredibly easy to circumvent limited exclusion orders"); *see also Certain Air Mattress Systems, Components Thereof, and Methods of Using the Same*, Inv. No. 337-TA-971, Comm'n Op. at 66 (June 20, 2017) ("the Commission has determined to issue an LEO prohibiting the unlicensed entry of infringing air mattress systems, components thereof, and methods of using the same . . . that are manufactured abroad by or on behalf of, or imported by or on behalf of Respondents, or their affiliated companies, parents, subsidiaries, or other related business entities, or their successor or assigns.").

Neither Respondents nor their experts argued for any exception or carve-out to a limited exclusion order. (*See* Tr. (Vander Veen) at 1269:9-13 ("Q. You've not opined any carve outs to a limited exclusion order are appropriate in this investigation, correct? A. I have not done an analysis based on the scope of an exclusion order.").).

This decision also recommends including a certification provision. The Commission now generally includes a certification provision in every exclusion order because it is something that "CBP typically requests." *Certain Road Construction Machines & Components Thereof*, Inv. No. 337-TA-1088, Comm'n Op., 2019 WL 6003332, at *27 (July 15, 2019); *Certain Composite Aerogel Insulation Materials and Methods for Manufacturing the Same*, Inv. No. 337-1003, Comm'n Op., at 62 (Feb. 22, 2018) (explaining that "the Commission's standard practice for the past several years [is] to include certification provisions in exclusion orders to aid CBP"). The Commission's typical certification provision gives CBP discretion to require "persons seeking to import covered articles that are potentially subject to [the] Order" to "certify that they are

familiar with the terms of [the] Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry" under the order. *See e.g.*, *Certain High-Density Fiber Optic Equipment and Components Thereof*, Inv. No. 337-TA-1194, General Exclusion Order, at 3-4 (Aug. 3, 2021).

C. Cease and Desist Orders Against the PUR and LifeStraw Respondents Are Warranted

Brita's expert, Mr. Philip Green, testified that the PUR, LifeStraw, and ZeroWater Respondents maintain commercially significant inventories of the Accused Products in the United States.[94] (Tr. (Green) at 709:12-710:1, 711:16-22; CDX-0010C.0046-48 (citing evidence pertaining to same).

Testimonial and documentary evidence reflect that PUR maintains a commercially significant inventory of the Accused PUR Plus Products in the United States. As of April 22, 2022, PUR maintained an inventory of approximately [redacted] of Accused PUR Plus Products with an inventory value of approximately [redacted] (Tr. (Green) at 710:2-11; CX-0414C (Green Ex. Q-5 showing PUR inventory); CX-0492C (PUR inventory). According to PUR sales information, Mr. Green also determined that this inventory level amounted to approximately [redacted] of sales. (Tr. (Green) at 710:12-17; CX-0409C – CX-0411C (Green Exs. Q, Q-1, and Q-2 reviewing inventory and sales); CX-0494C (PUR sales); CDX-0010C.0048 (demonstrating evidence pertaining to same).).

The record evidence also reflects that LifeStraw maintained a commercially significant inventory [redacted] of Accused LifeStraw Home Products worth

[94] When he testified on August 19, 2022, Mr. Philip Green was the founder and Principal of Hoffman Alvary Company LLC. (CPSt. at Att. D.). Brita identified Mr. Green as an expert to testify about, *inter alia*, the "appropriate remedy." (*Id.* at 3.).

approximately [redacted]. (Tr. (Green) at 710:18-22; CX-0413C (Green Ex. Q-4 showing LifeStraw inventory); CX-0313C (LifeStraw inventory).). According to LifeStraw's sales information, Mr. Green determined that this inventory amounts to approximately [redacted] of sales. (Tr. (Green) at 710:22-25; CX-0317C (LifeStraw sales); CX-0409C – CX-0411C (Green Exs. Q, Q-1, Q-2 reviewing inventory and sales); CDX-0010C.0048 (demonstrating evidence pertaining to same).).

PUR and LifeStraw did not dispute that a CDO is appropriate. (*See* RPBr. at 143-45.). Thus, PUR and LifeStraw have abandoned, waived or withdrawn any argument on this issue under Ground Rule 7.2. Therefore, a CDOs against PUR and LifeStraw are appropriate.

With regard to ZeroWater, Brita failed to prove that a CDO is warranted. Mr. Green concluded that ZeroWater's inventory is commercially significant, but his analysis appears to be mistaken, and thus not persuasive or credible. During the Hearing, Mr. Green provided the following testimony:

> Q. What about the ZeroWater Respondents accused products?
>
> A. So the ZeroWater Respondents accused products, they had -- it's sort of an unusual circumstance. ***The value of the inventory is about*** [redacted] ***but the units don't make a lot of sense considering the value of the inventory***.
>
> So I can see that they have a significant inventory value in dollar terms, but I didn't have anything to sort of evaluate that in terms of real -- what those really mean. And I also didn't have any sales information from them.

(Tr. (Green) at 711:1-11 (emphasis added).).

As Respondents pointed out, ZeroWater's [redacted] valued at [redacted] means that ***each unit*** would have a value of nearly [redacted]. (RRBr. at 29.). Brita's own analysis values each unit at around [redacted]. (Tr. (Green) at 714:3-12 referencing CDX-0010C.0050.). In view of Brita's calculated value of each unit and the acknowledgement by Brita's own expert that the [redacted]

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value given the number of units "don't make a lot of sense," Brita has not met its burden of proof to demonstrate that ZeroWater has significant inventory in the United States. Thus, a CDO against Respondent ZeroWater is not appropriate.

D. Bond During the Presidential Review Period Is Warranted

Brita requested a recommendation that the Commission impose a bond during the PRP of 100% of the entered value of the products at issue. (CPBr. at 149; CBr. at 97-98.). For the reasons discussed below, the value of the bond entered during the PRP should be set at: (i) 100% for PUR and ZeroWater; and (ii) $6 per unit based on the filter price differential for LifeStraw.

The Commission frequently sets the bond based on the difference in sales prices between the patented domestic product and the infringing product. *See, e.g.*, *Certain Microsphere Adhesives, Process for Making Same, and Prods. Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, USITC Pub. No. 3949, Comm'n Opinion at 24 (Jan. 1996). In other instances, when a direct comparison between a patentee's product and the accused product is not possible, the Commission has set the bond at a reasonable royalty rate. *See, e.g.*, *Certain Integrated Circuit Telecommunication Chips and Prods. Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm. Opinion at 41-43 (Aug. 3, 1993). Commission precedent allows for a 100 percent bond when it is not practical or possible to set the bond based on price differential. *Certain Voltage Regulators, Components Thereof and Prods. Containing Same*, Inv. No. 337-TA-564, Comm'n Opinion at 79 (Public Version Oct. 19, 2007). The purpose of the bond is to protect the complainant from any injury. 19 U.S.C. § 1337(j)(3); 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

Complainants bear the burden of establishing the need for a bond, including the amount of bond. *See, e.g.*, *Certain Rubber Antidegradants, Components Thereof & Prods. Containing*

Same, USITC Pub. No. 3975, Inv. No. 337-TA-533, Comm'n Opinion at 40 (April 2008); *Certain Coenzyme Q10 Prods. and Methods of Making Same*, Inv. No. 337-TA-790, Initial and Recommended Determination (Sept. 27, 2012) (recommending Commission not impose a bond because complainant failed in its burden to demonstrate the appropriate bond amount); *Certain Mobile Telephones and Wireless Commc'n Devices Featuring Digital Cameras, and Components Thereof*, Inv. No. 337-TA-703, Recommended Determination (Jan. 24, 2011) (recommending no bond because complainant did not meet its burden in providing evidence on the necessity of a bond); *Certain Liquid Crystal Display Devices and Prods. Containing the Same*, Inv. No. 337-TA-631, Comm'n Opinion at 27-28 (July 14, 2009) (setting zero bond because complainant "simply claimed that it was impossible to conduct a price differential analysis" and "should not benefit from a lack of any effort to identify" relevant pricing information, particularly that which is in its possession).

Mr. Green testified that Respondents' Accused Products compete with the DI Products in the U.S. market. (Tr. (Green) at 712:15-23, 715:15-22 (explaining that the parties compete because "when Brita loses a sale of a container to one of the Respondents, it's also losing future sales of filters").). The bond should be sufficient to protect Brita from any injury caused by the continued importation and presence in the market of high-performance gravity-fed water filters and products containing the same that infringe the asserted claims of the '141 patent during the PRP. Thus, a bond of zero percent would not be appropriate because it would not protect Brita from harm caused by lost DI Product sales. (*Id.* at 715:15-22.).

To the extent a bond equal to 100% of entered value is not awarded, Mr. Green determined that a price differential may be appropriate at least with respect to LifeStraw. For the price differential analysis for LifeStraw, Mr. Green compared LifeStraw's average price to retail

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for the Accused LifeStraw Products, including filters and containers, with Brita's average price to retail for the DI Products. (*Id.* at 713:8-714:2.). He found that a price differential of approximately $6 per unit exists with respect to the Accused LifeStraw Products. (*Id.*; *see also* CX-0420C (Green Ex. R summarizing price differentials); CX-0422C (Green Ex. R-2 showing Brita price to retail); CX-0423C (Green Ex. R-3 showing LifeStraw price to retail); CX-0191C (Brita price list); CX-0318C (LifeStraw sales); CDX-0010C.0050 (demonstrating evidence pertaining to same).). Because LifeStraw did not provide any rebuttal argument in Respondents' Pre-Hearing or Post-Hearing Reply Brief, LifeStraw has abandoned, waived or withdrawn any argument on this issue under Ground Rules 7.2 and 10.1. (*See* RPBr. at 143-45; RRBr. at 28-30.).

For the foregoing reasons, a bond rate based on the $6 filter price differential is appropriate for LifeStraw.

With regard to PUR and ZeroWater, Mr. Green explained that he considered the Accused PUR Plus and ZeroWater Products' prices ***at*** retail based on the evidence of record. (Tr. (Green) at 713:8-714:14).). He [redacted]. (*Id.*). However, Mr. Green explained that because he did not have information to compare their pricing ***to*** retail, he concluded that a price differential was not a reliable indication of the amount of bond that would be appropriate. (*Id.* at 714:3-12; CX-0420C (Green Ex. R summarizing price differentials); CX-0421C (Green Ex. R-1 showing Brita price at retail); CX-0424C (Green Ex. R-4 showing PUR price at retail); CX-0429C (Green Ex. R-9 showing ZeroWater price at retail); CX-0191C (Brita price list); CX-0461C (PUR sales); CDX-0010C.0050 (demonstrating evidence pertaining to same). Accordingly, a bond equal to 100% of entered value is appropriate with respect to the

Accused PUR Plus and ZeroWater Products. (Tr. (Green) at 712:6-14; CDX-0010C.0049 (demonstrating evidence pertaining to same).).

Dr. Vander Veen, ZeroWater's economic expert, opined that a zero percent bond was appropriate because the DI Products have a lower price-per-gallon than the Accused ZeroWater Products. (Tr. (Vander Veen) at 1264:21-1267:1.). However, his analysis in this context is irrelevant. Dr. Vander Veen agreed that a price-per-gallon comparison only shows consumers how to save money per gallon. (Tr. (Vander Veen) at 1279:4-10; CDX-0016C.0002 (Vander Veen cross demonstrative pertaining to same).). Dr. Vander Veen did not provide a direct retail or consumer price comparison. As Mr. Green explained, Dr. Vander Veen's approach based on a price-per-gallon does not protect Brita from injury flowing from infringing imports during the PRP. (Tr. (Green) at 715:1-14 (explaining that "price differential based on cost savings to a consumer . . . doesn't make any sense" and "[h]ow much water somebody drinks is not the measure of a bond").). Thus, Dr. Vander Veen's opinion has been given little, if any, weight.

Respondents argued that Brita failed to produce evidence of a bond that would be necessary to protect Brita from harm due to the continued importation of the Accused PUR Plus Products during the PRP. (RRBr. at 28.). Respondents claimed that there is no harm to Brita through the importation and sale of PUR filters because "PUR replacement filters cannot be used on Brita pitchers and vice versa." (*Id.*). According to Respondents, "[s]ales of Brita filters are not impacted by the existence of replacement PUR filters as PUR filters cannot be used in Brita pitchers. Thus, Brita's consumers are not choosing PUR filters over Brita filters when it comes to replacements." (*Id.*). Respondents' assertions are not persuasive. As Mr. Green explained, when Brita loses a sale of a LongLast container to PUR, Brita also loses future LongLast filter sales. (Tr. (Green) at 715:15-22.). In other words, for example, the market competition is for

replacement of a Brita water pitcher and filter in combination if a PUR water pitcher and filter is withdrawn from the marketplace because of PUR's violation of Section 337 and any LEOs that may issue. Therefore, a bond of zero percent would not be appropriate because it would not protect Brita from harm caused by lost DI Product sales.

For the reasons discussed above, a bond rate of 100% of the entered value of their products at issue is appropriate for PUR and ZeroWater.

XV. WAIVER OR WITHDRAWAL OF RESPONDENTS' DEFENSES

Respondents did not raise in its Pre-Hearing Brief or offer any evidence during the Hearing to support:

(1) PUR Respondents' Fourth Affirmative Defense (unenforceability), Fifth Affirmative Defense (prosecution history estoppel), Sixth Affirmative Defense (ensnarement), Seventh Affirmative Defense (waiver), and Ninth Affirmative Defense (license and exhaustion). (Doc. ID No. 763740 (PUR Resp.) (Feb. 22, 2022) at 32-33.).

(2) ZeroWater Respondents' Third Affirmative Defense (unenforceability), Sixth Affirmative Defense (Relief Not in Public Interest). (Doc. ID No. 763725 (Feb. 22, 2022) at 25-27.).

(3) LifeStraw Respondent's Third Affirmative Defense (estoppel, acquiescence, laches and waiver), Fifth Affirmative Defense (public interest), Sixth Affirmative Defense (prosecution history estoppel), Seventh Affirmative Defense (inventorship), Ninth Affirmative Defense (lack of unfair acts). (Doc. ID No. 763712 (LifeStraw Respondent) (Feb. 22, 2022) at 23-25.).

Respondents' Pre-Hearing Brief argued the Affirmative Defenses of standing, unenforceability, equitable estoppel and improper inventorship. (RPBr. at 133-43.). Respondents did not adduce at trial, nor did they include in their Post-Hearing briefing, evidence

to support their Affirmative Defenses of unenforceability, equitable estoppel and improper inventorship. (Doc ID No. 783521 (Joint Outline of Issues) (Nov. 1, 2022) at 5-6; RBr. at 116-21.).

Consequently, other than the Affirmative Defense of standing, it is a finding of this decision that PUR Respondents, ZeroWater Respondents, and LifeStraw Respondents have withdrawn, waived and/or abandoned their Affirmative Defenses consistent with Ground Rules 7.2 and 10.1. *Kinik Co. v. Int'l Trade Comm'n*, 362 F.3d 1359, 1367 (Fed. Cir. 2004).

XVI. CONCLUSIONS OF FACT OR LAW: THIS INITIAL DETERMINATION FINDS A SECTION 337 VIOLATION BASED UPON INFRINGEMENT OF U.S. PATENT NO. 8,167,141

1. Brita has satisfied jurisdiction and standing requirements.
2. Importation has been satisfied.
3. Claims 1-6 and 23 of U.S. Patent No. 8,167,141 are valid and have been found to be practiced by the Accused Products.
4. At least one of Brita's DI Products practices one or more claims of U.S. Patent No. 8,167,141.
5. Brita's domestic R&D activities with respect to its DI Products have been found to satisfy the economic prong of the domestic industry requirement under 19 U.S.C. § 337(a)(3)(A) and (B).
6. PUR, ZeroWater, and LifeStraw Respondents have violated Section 337 of the Tariff Act of 1930, as amended, by importing into the United States, selling for importation, or selling within the United States after importation certain gravity-fed water filters that infringe claims 1-6 and 23 of U.S. Patent No. 8,167,141.
7. Limited Exclusion Orders against the PUR, ZeroWater and LifeStraw Respondents; Cease and Desist Orders against the PUR and LifeStraw Respondents; a 100% Bond of the entered value of the Accused Products against PUR and ZeroWater Respondents during the Presidential Review Period; and a $6 per unit bond rate against the LifeStraw Respondent during the Presidential Review Period are recommended.

The lack of discussion of any matter raised by the Parties, or any portion of the record, does not indicate that it has not been considered. Rather, any such matter(s) or portion(s) of the

record has/have been determined to be irrelevant, immaterial or meritless. Arguments made on briefs, which were otherwise unsupported by record evidence or legal precedent, have been accorded no weight.

XVII. CONCLUSION AND ORDER

This Initial Determination on Violation of Section 337 of the Tariff Act of 1930 is certified to the Commission. All orders and documents, filed with the Secretary, including the exhibit lists enumerating the exhibits received into evidence in this Investigation, that are part of the record, as defined in 19 C.F.R. § 210.38(a), are not certified, since they are already in the Commission's possession in accordance with Commission Rules. *See* 19 C.F.R. § 210.38(a). In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential under 19 C.F.R. § 210.5 is to be given *in camera* treatment.

After the Parties have provided proposed redactions of confidential business information ("CBI") that have been evaluated and accepted, the Secretary shall serve a public version of this ID upon all parties of record. The Secretary shall serve a confidential version upon counsel who are signatories to the Protective Order (Order No. 1) issued in this Investigation.

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission unless a party files a petition for review pursuant to 19 C.F.R. § 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion a review of the Initial Determination or certain issues therein.

Within fourteen (14) business days of the date of this document, the Parties shall <u>jointly</u> submit to the Office of the Administrative Law Judges through McNamara337@usitc.gov a statement whether they seek to have any confidential portion of this document. That is the courtesy copy pursuant to Ground Rule 1.3.2. Any party seeking redactions to the public version

must submit to this office through McNamara337@usitc.gov a copy of a proposed public version of this document pursuant to Ground Rule 1.10 with colored highlighting clearly indicating any portion asserted to contain confidential business information. The Parties' submission shall also include an index identifying the pages of this document where proposed redactions are located. The Parties' submission concerning the public version of this document need not be filed with the Commission Secretary.

SO ORDERED.

MaryJoan McNamara
Administrative Law Judge

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the parties listed have entered an appearance in the above captioned investigation, and a copy of the PUBLIC CERTIFICATE OF SERVICE was served upon the following parties via first class mail and air mail where necessary.

Document	Security	Document Type	Official Rec'd Date	Title
804714	Public	Opinion, Commission	09/22/2023 01:11 PM	Commission Opinion

Service Date: September 22, 2023

/s/

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US008167141B2

(12) **United States Patent**
Knipmeyer et al.

(10) **Patent No.: US 8,167,141 B2**
(45) **Date of Patent: May 1, 2012**

(54) **GRAVITY FLOW FILTER**

(75) Inventors: **Elizabeth L. Knipmeyer**, Pleasanton, CA (US); **Toni L. Lynch**, Pleasanton, CA (US); **Roger P. Reid**, Caldwell, ID (US); **Bruce D. Saaski**, Caldwell, ID (US)

(73) Assignee: **Brita LP**, Oakland, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 903 days.

(21) Appl. No.: **12/207,284**

(22) Filed: **Sep. 9, 2008**

(65) **Prior Publication Data**

US 2009/0001011 A1 Jan. 1, 2009

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/858,765, filed on Sep. 20, 2007, and a continuation-in-part of application No. 11/927,372, filed on Oct. 29, 2007, which is a continuation-in-part of application No. 10/881,517, filed on Jun. 30, 2004, now abandoned.

(60) Provisional application No. 60/846,162, filed on Sep. 20, 2006.

(51) **Int. Cl.**

B01D 27/02	(2006.01)
B01D 39/02	(2006.01)
B01D 24/00	(2006.01)

(52) **U.S. Cl.** **210/464**; 210/266; 210/282; 210/486; 210/502.1; 210/283

(58) **Field of Classification Search** .... None
See application file for complete search history.

(56) **References Cited**

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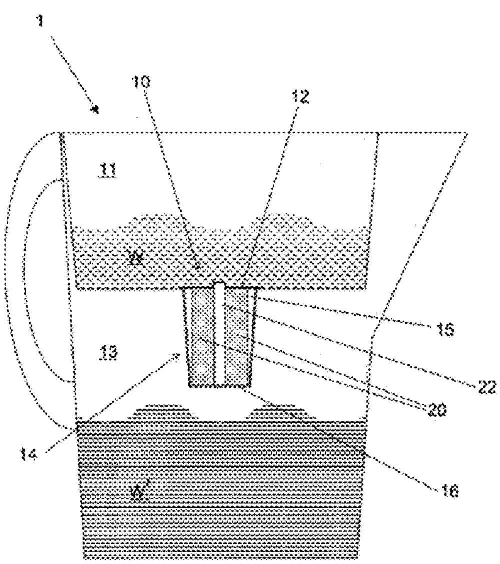
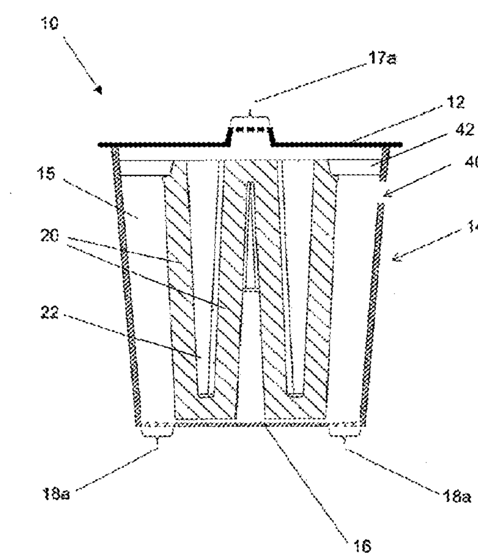
Primary Examiner — Nam Nguyen
Assistant Examiner — Madeline Gonzalez
(74) *Attorney, Agent, or Firm* — Stacy H. Combs

(57) **ABSTRACT**

A gravity-fed carbon block water filter in one embodiment includes a filter block comprising multiple sub-blocks each comprising filter media walls surrounding and defining a cavity for receiving fluid. Each of the sub-blocks is connected to at least one other of the sub-blocks by filter media of which the filter block is made. In one approach, the filter media includes about 20-90 wt % activated carbon, and about 5-50 wt % binder. In another approach, a lead concentration in a final liter of effluent water filtered by the filter is less than about 10 μg/liter after about 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 ppb total lead with 30-60 ppb being colloidal lead greater than 0.1 μm in diameter. A gravity-fed water filter in other embodiments has no specified shape but achieves a FRAP factor of about 350 or less.

24 Claims, 27 Drawing Sheets





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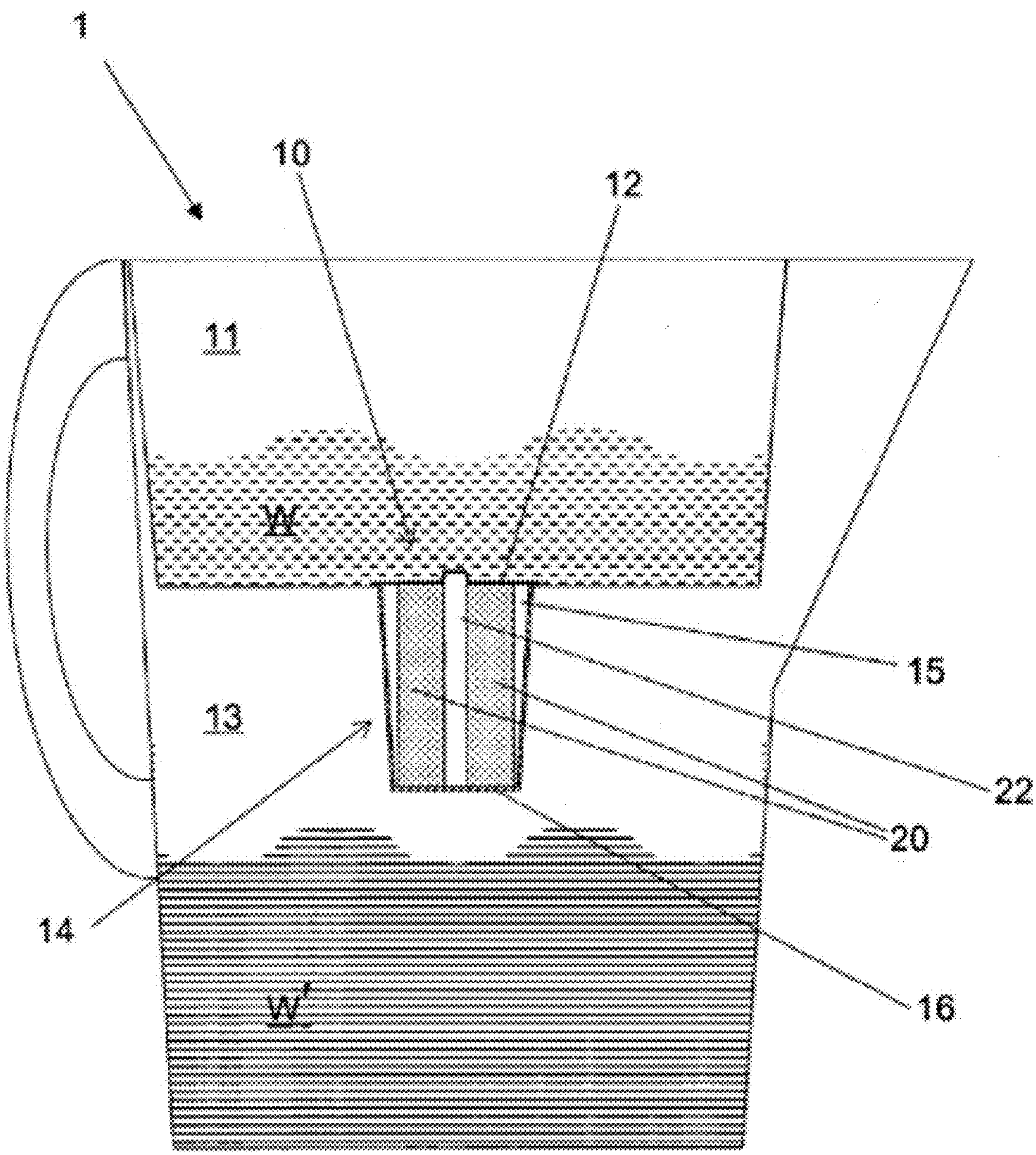

FIG. 1

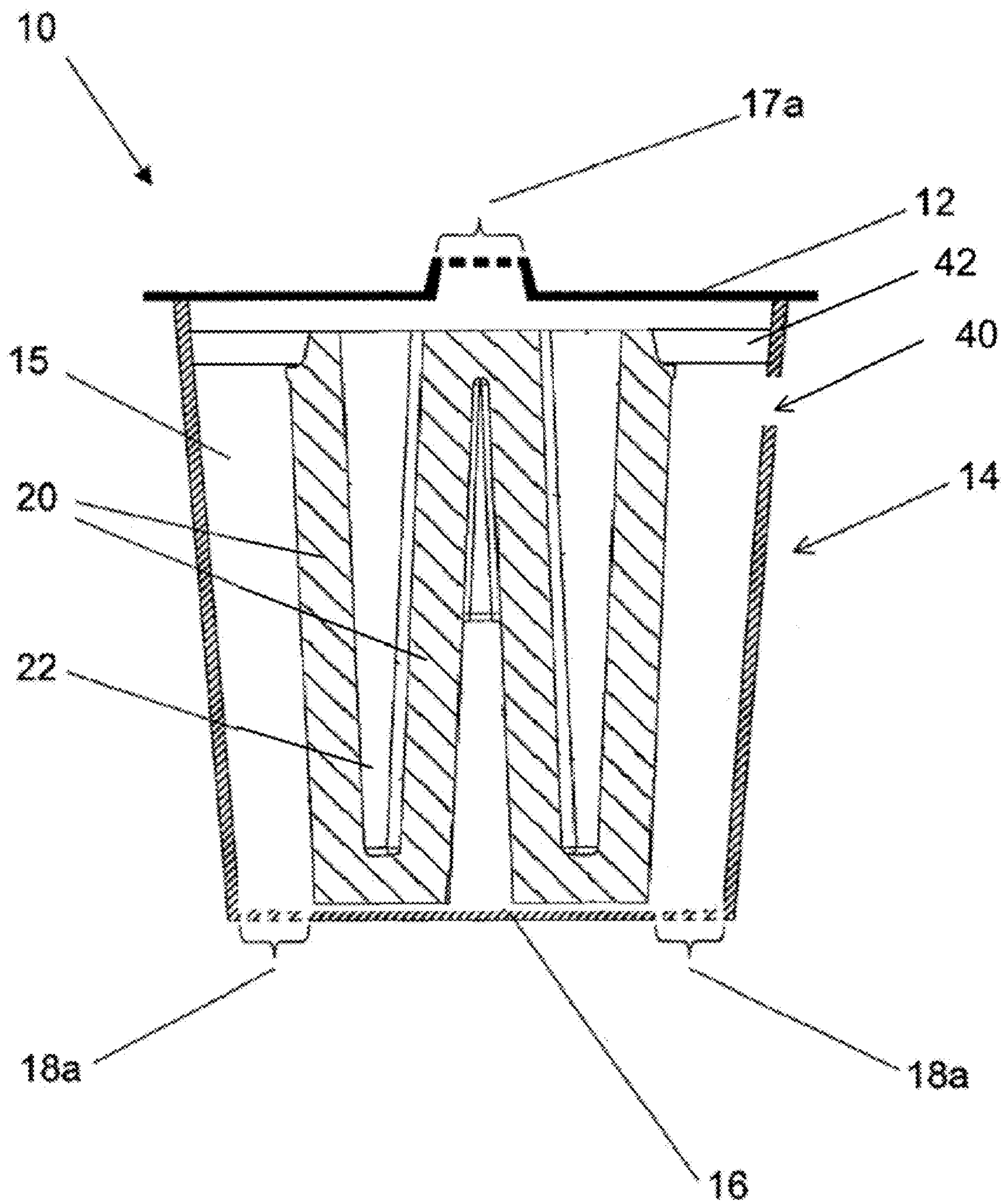

FIG. 2

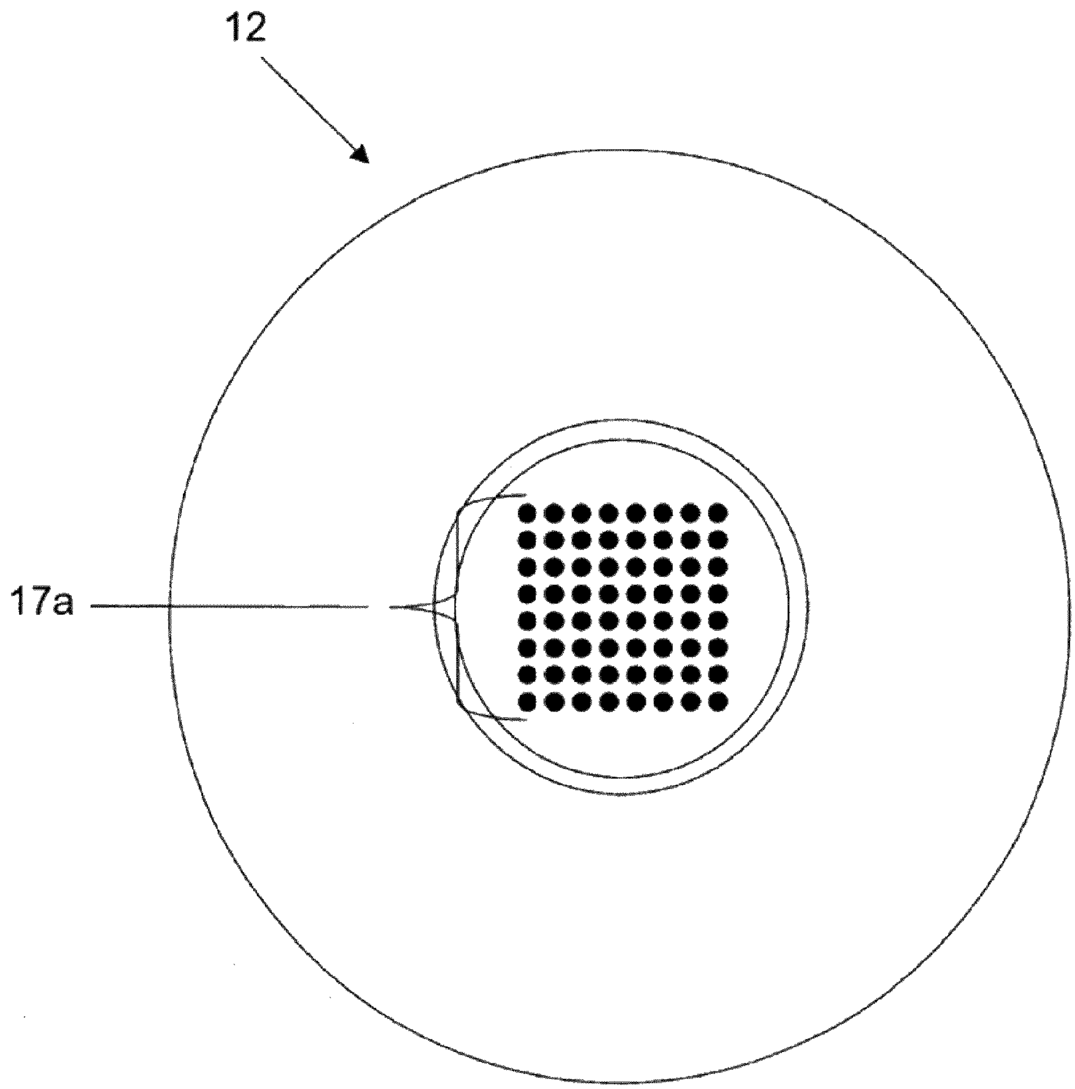

FIG. 3

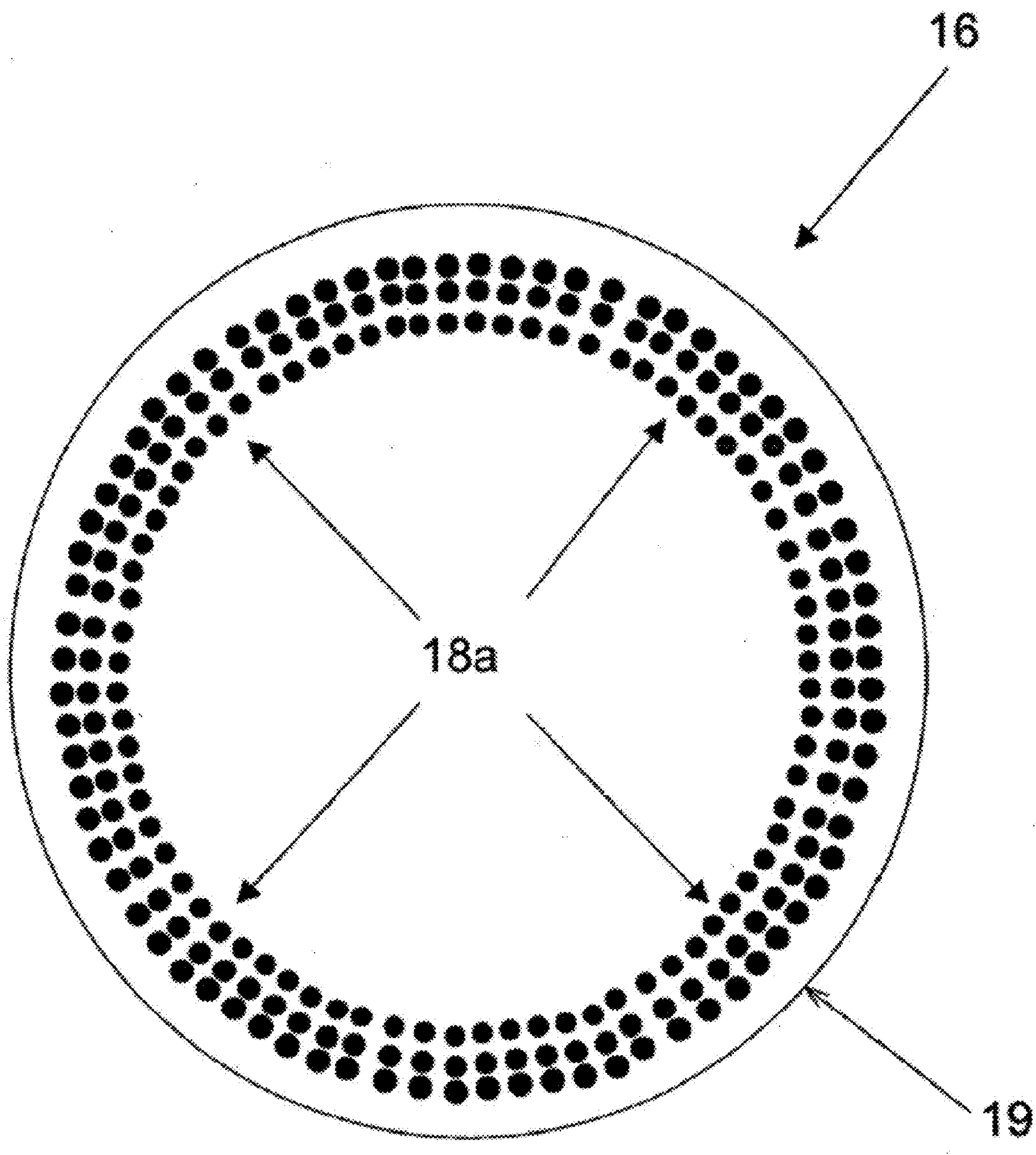

FIG. 4

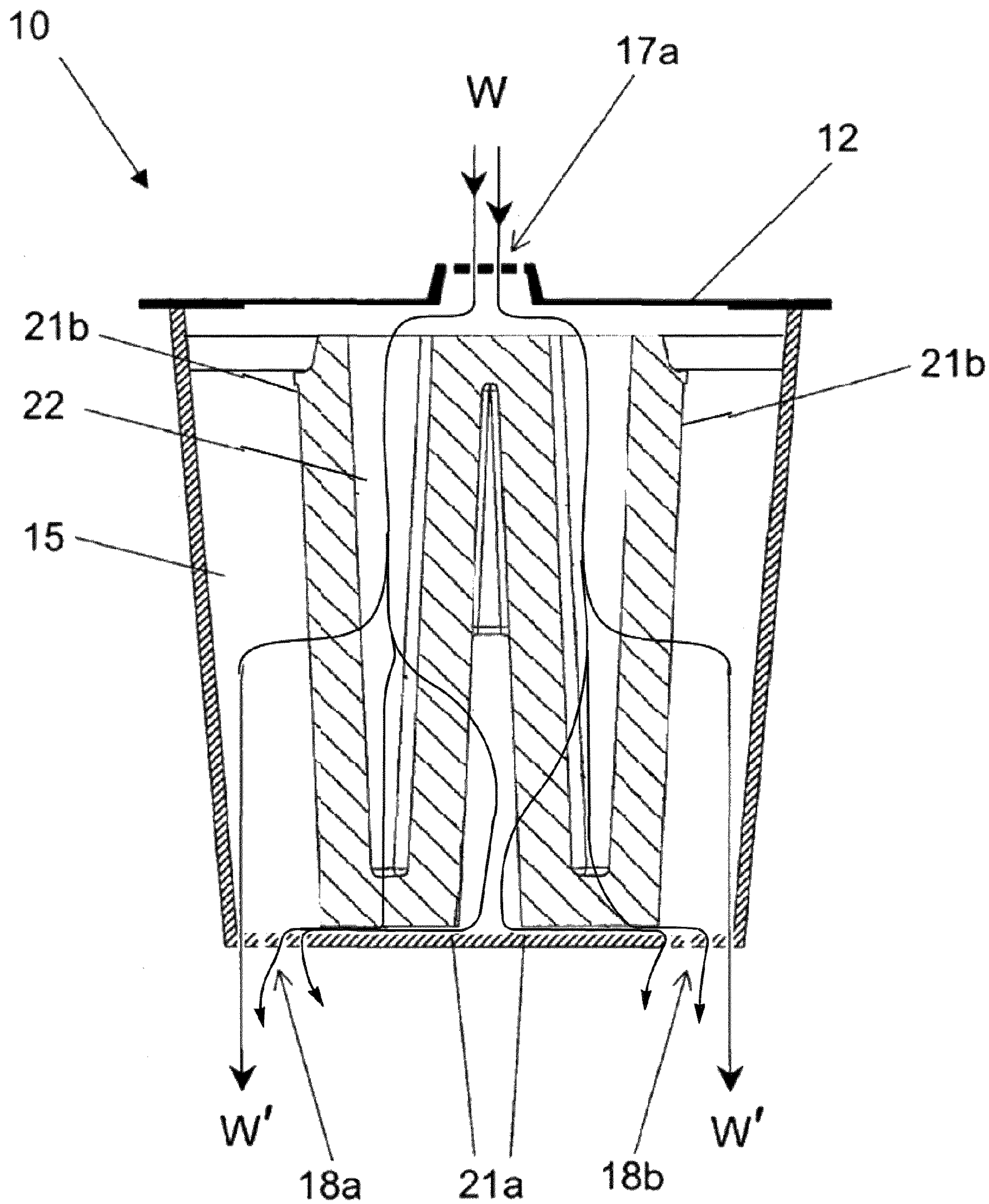

FIG. 5

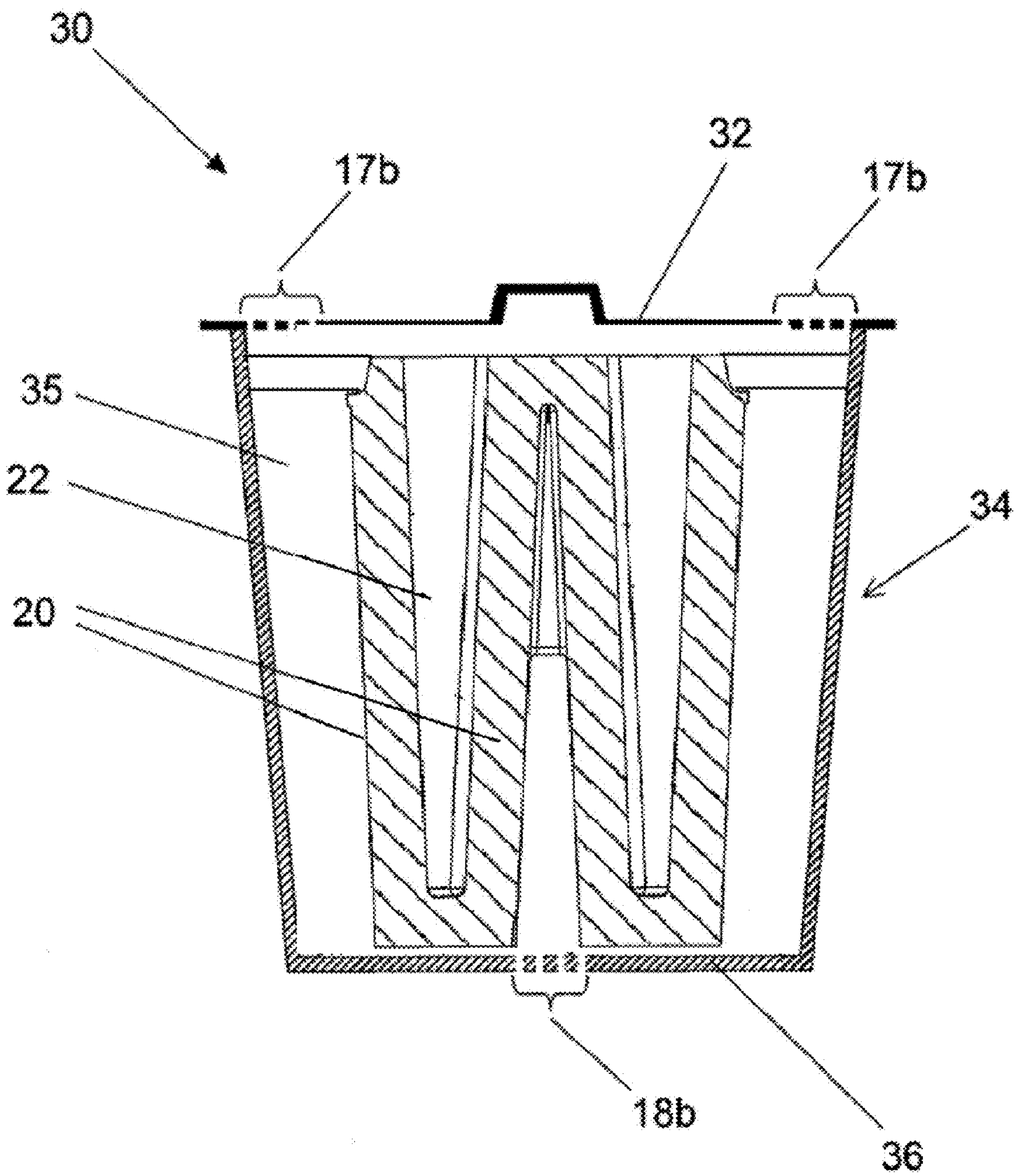

FIG. 6

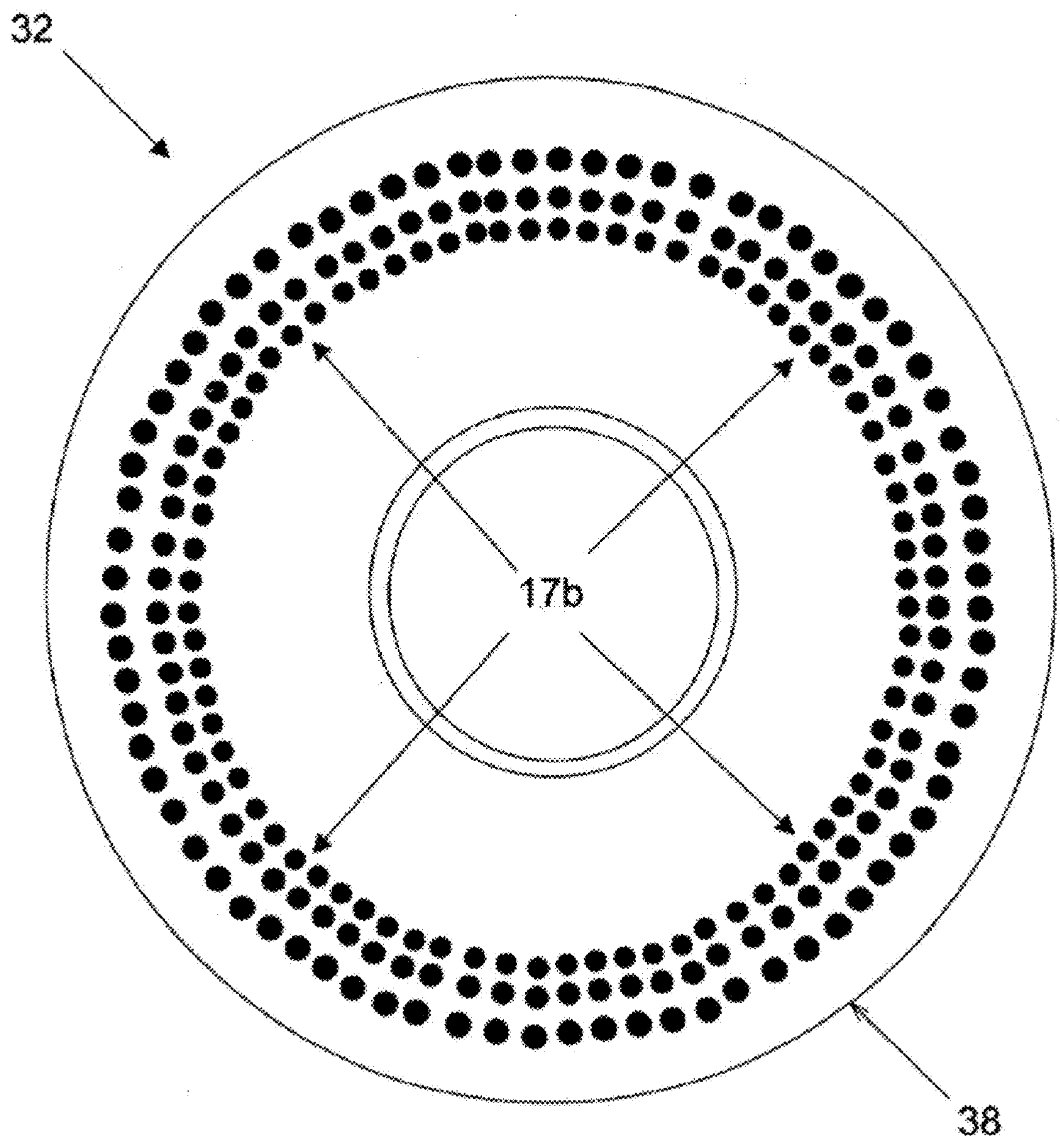

FIG. 7

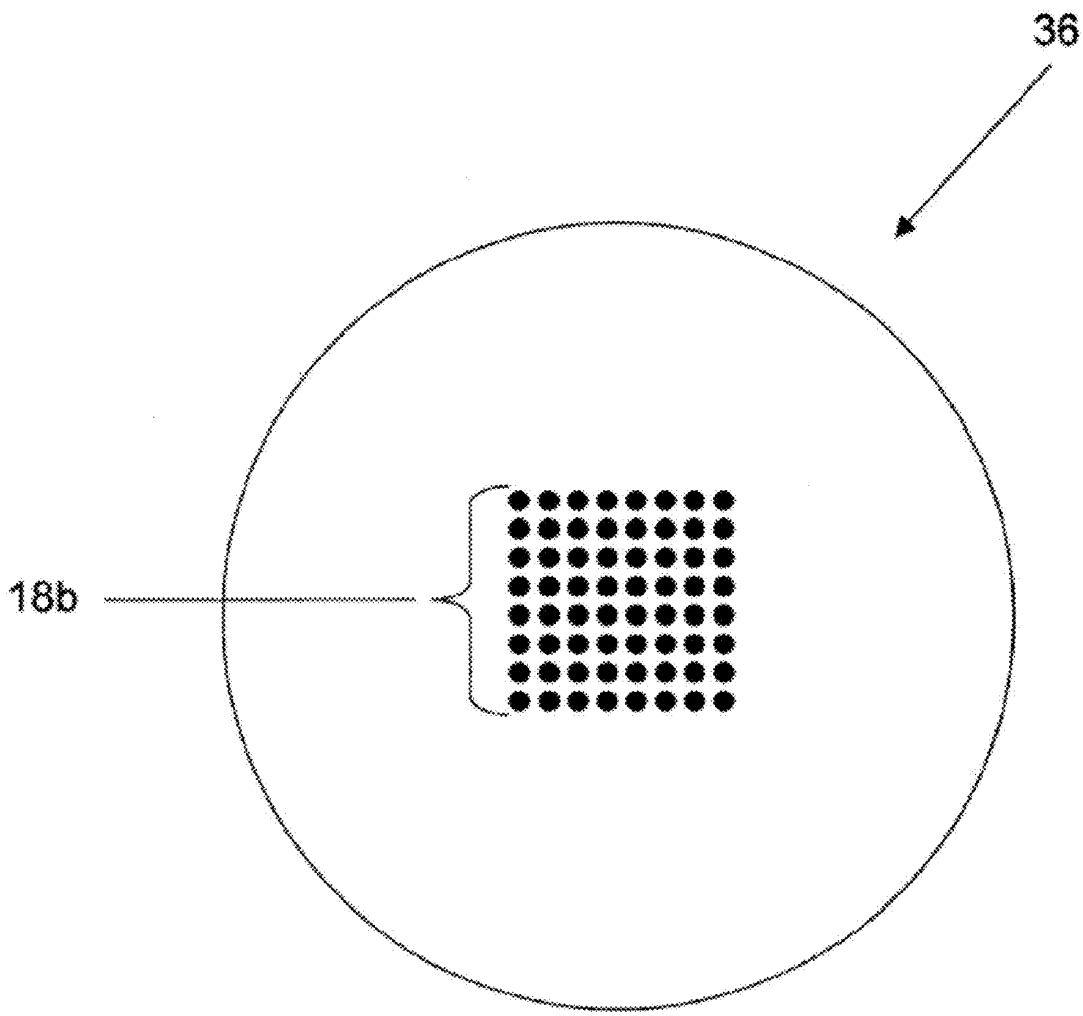

FIG. 8

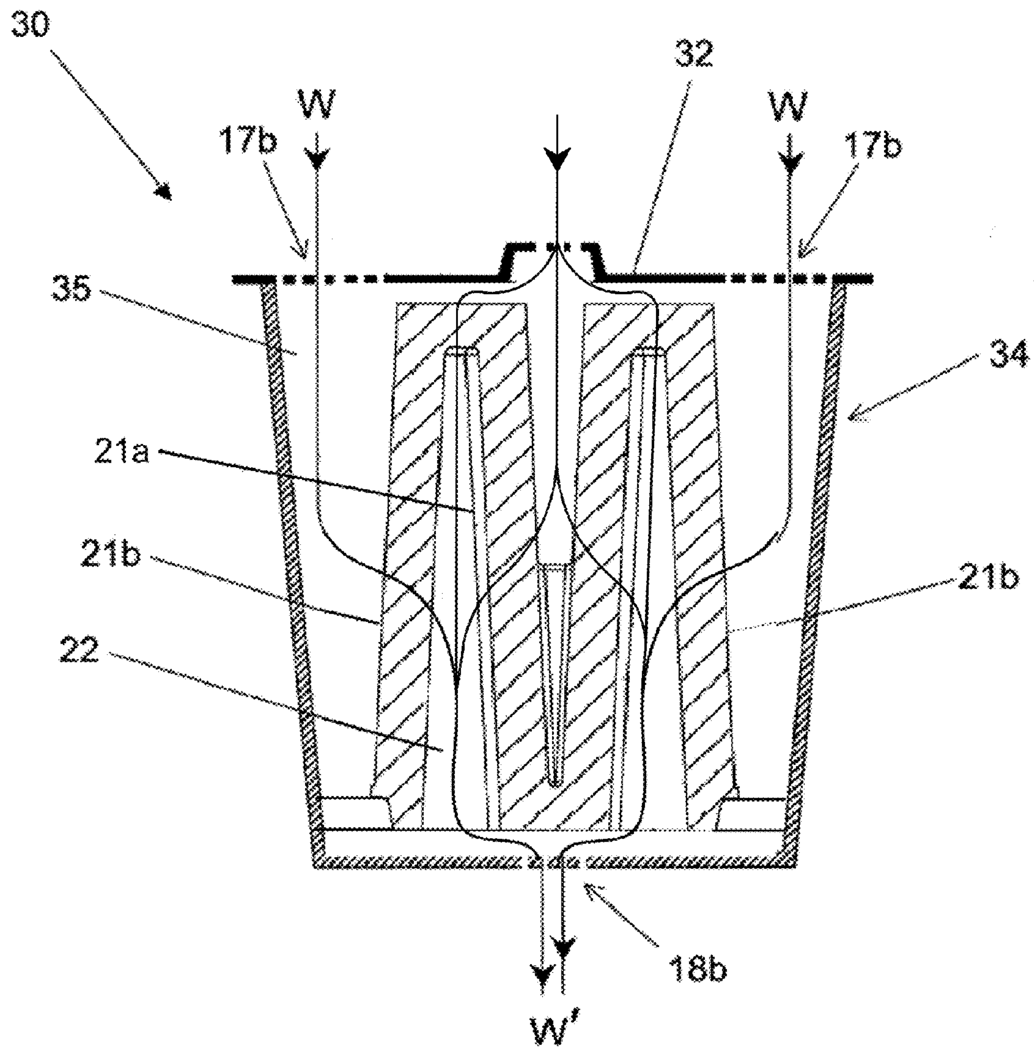

FIG. 9

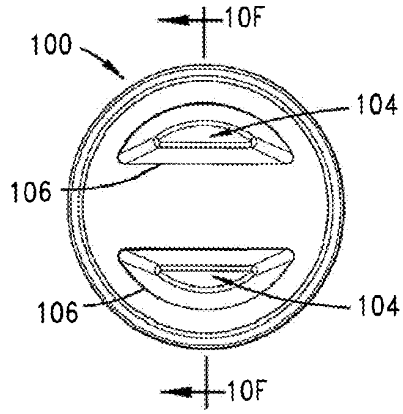

FIG. 10D

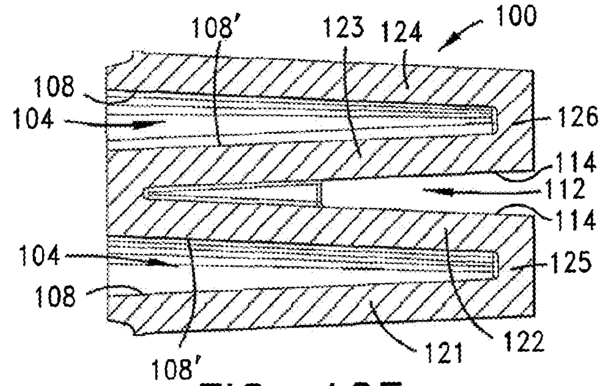

FIG. 10F

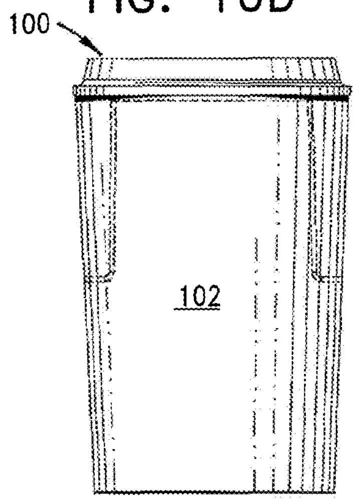

FIG. 10B

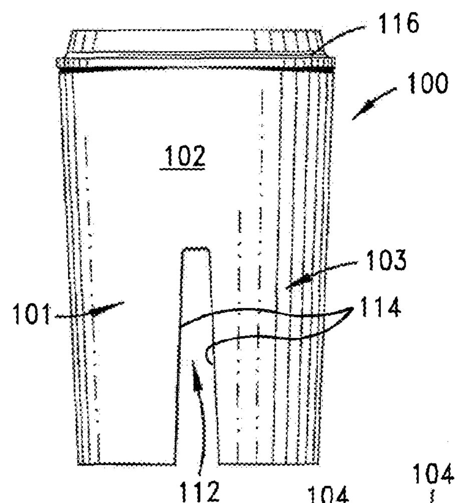

FIG. 10C

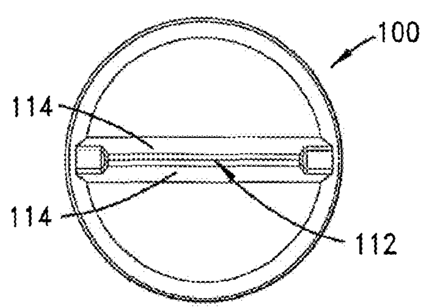

FIG. 10E

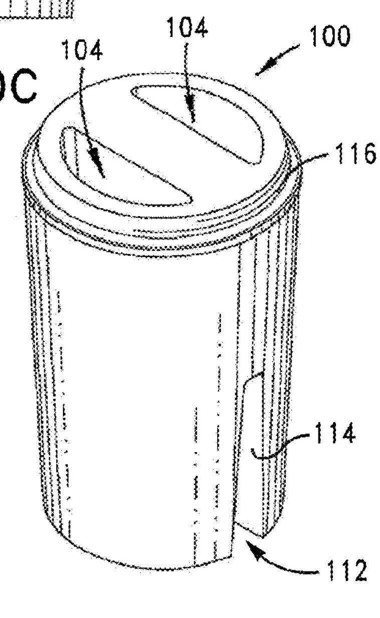

FIG. 10A

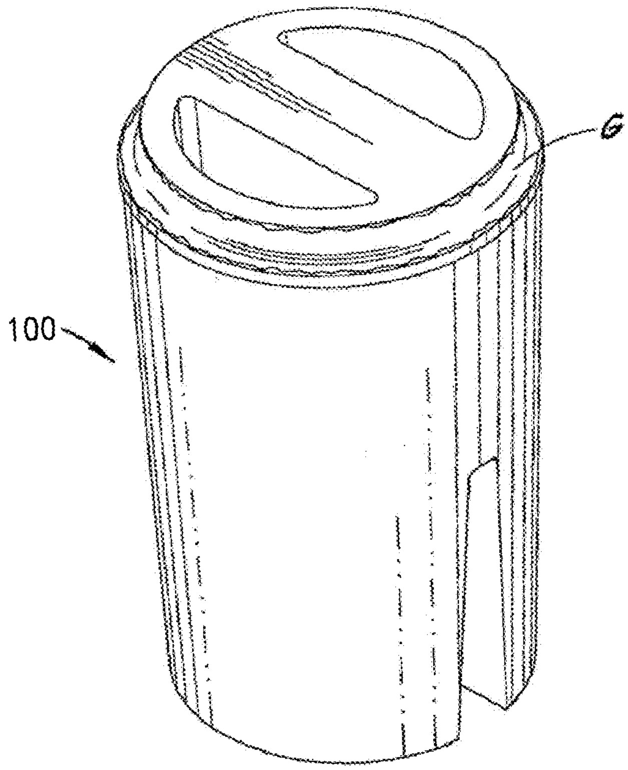

FIG. 10G

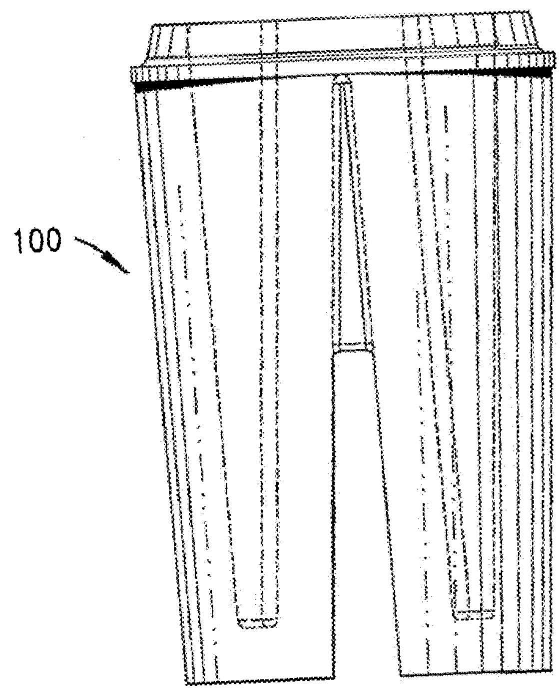

FIG. 10H

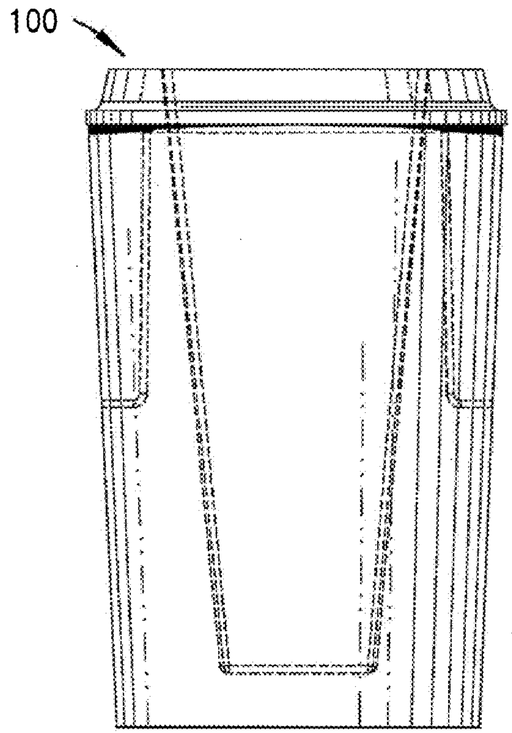

FIG. 10I

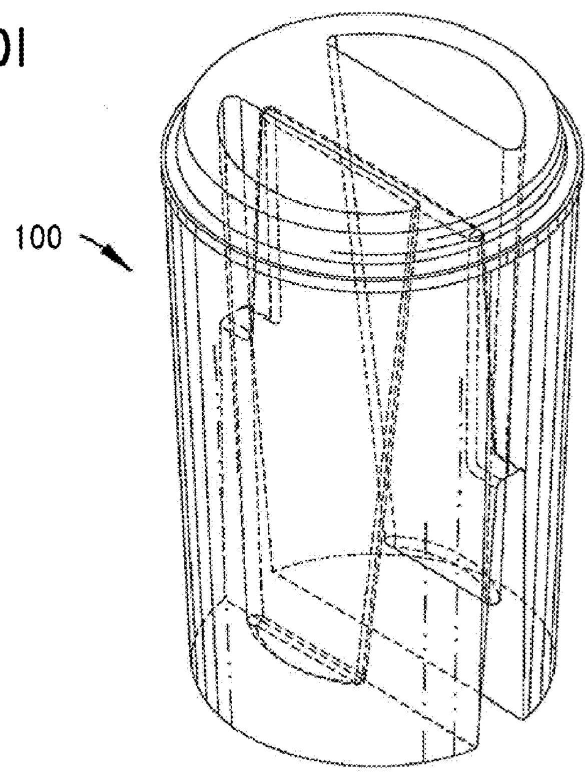

FIG. 10J

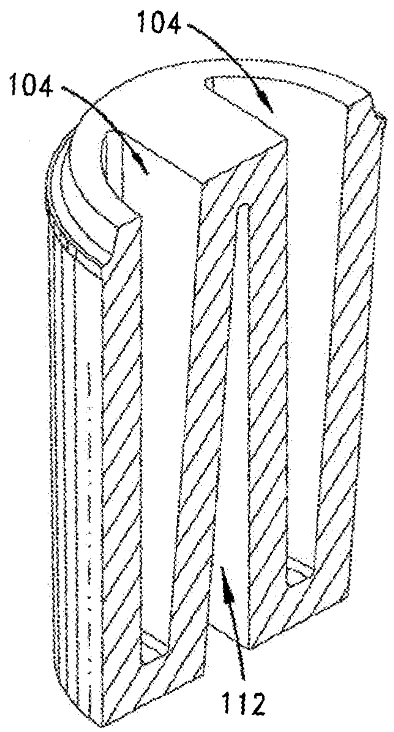

FIG. 10K

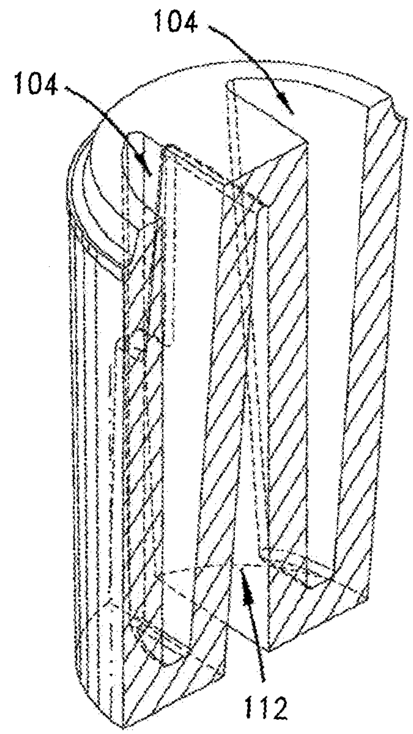

FIG. 10L

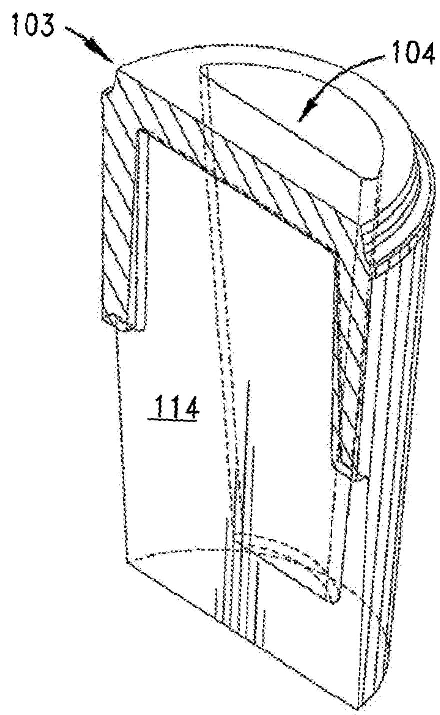

FIG. 10M

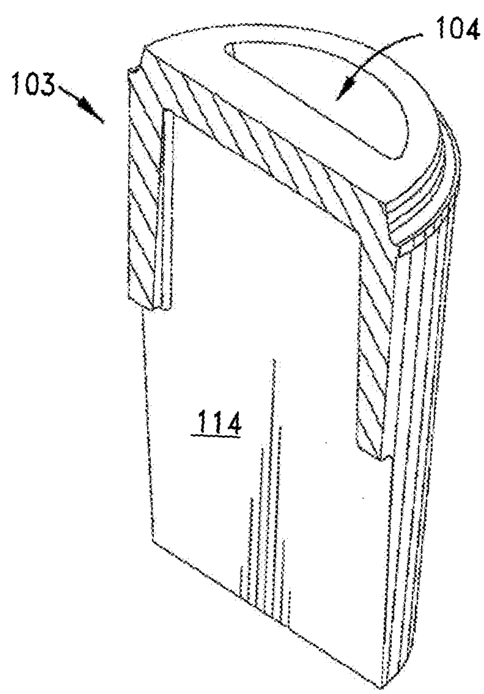

FIG. 10N

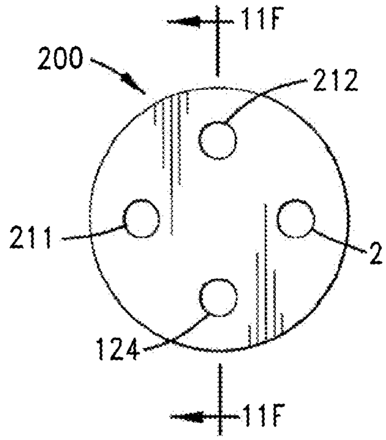

FIG. 11D

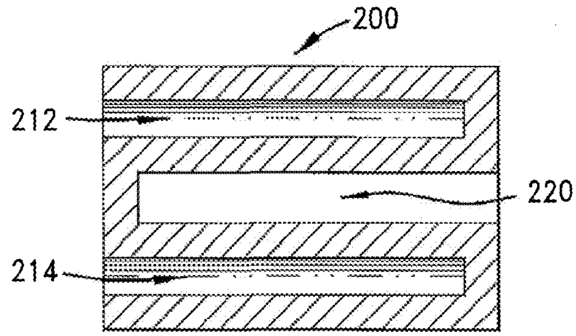

FIG. 11F

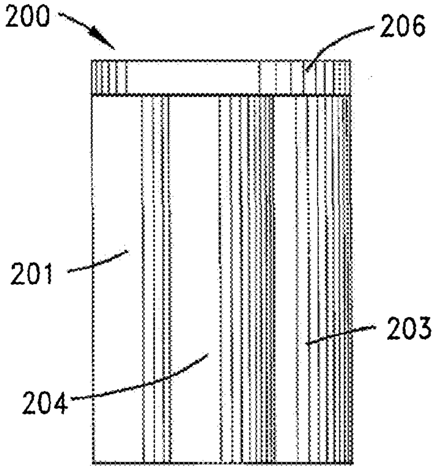

FIG. 11B

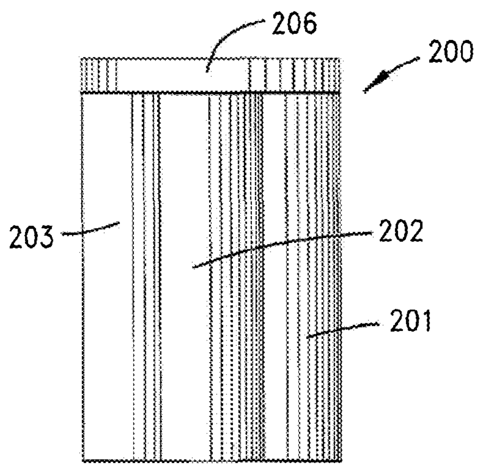

FIG. 11C

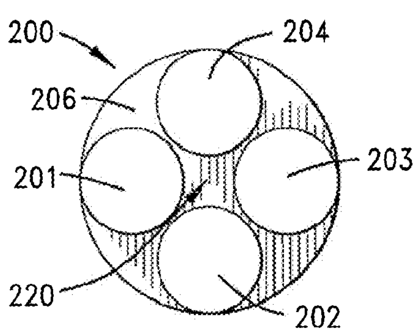

FIG. 11E

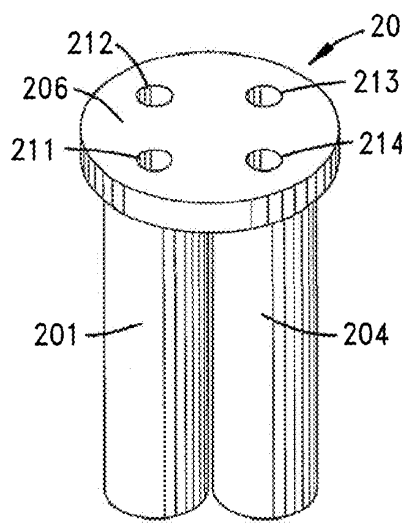

FIG. 11A

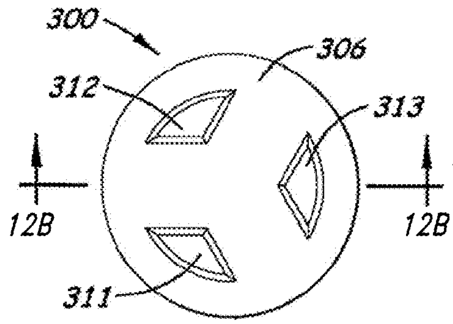

FIG. 12C

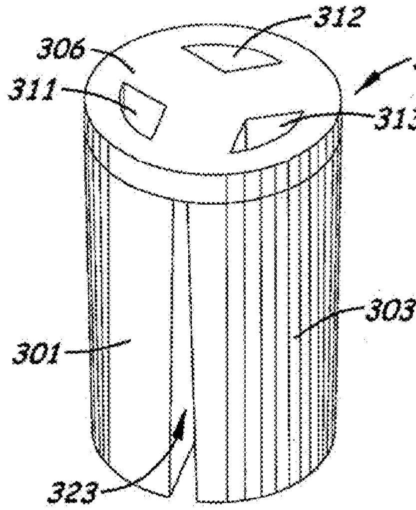

FIG. 12A

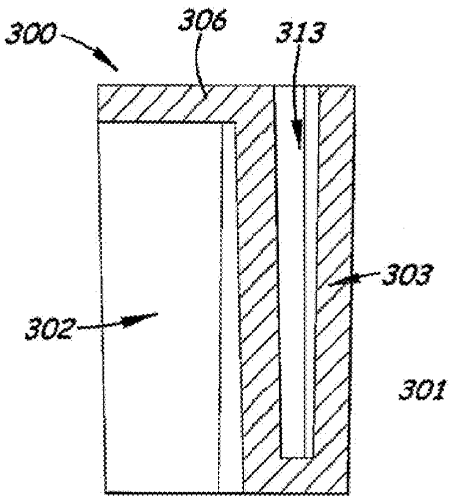

FIG. 12B

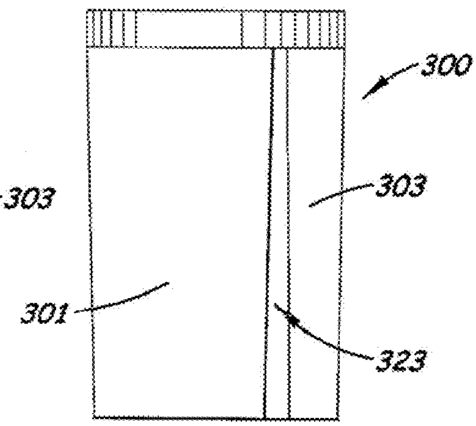

FIG. 12F

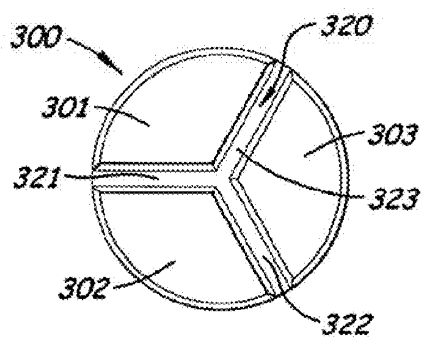

FIG. 12D

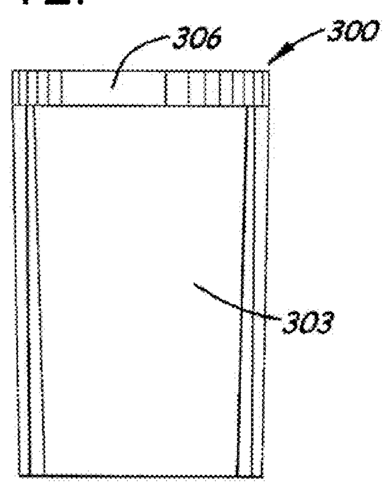

FIG. 12E

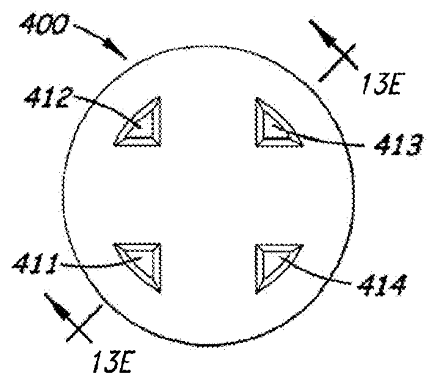

FIG. 13C

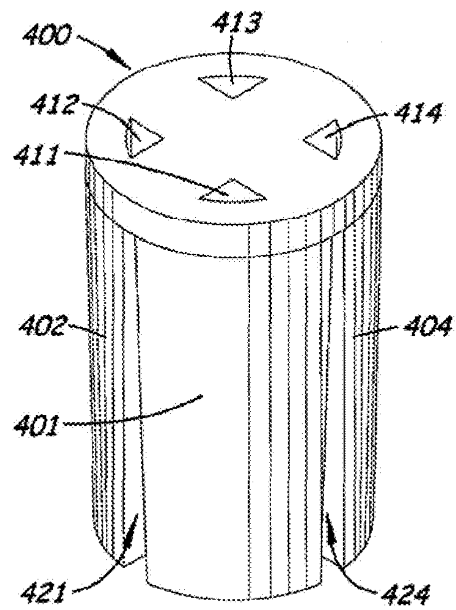

FIG. 13A

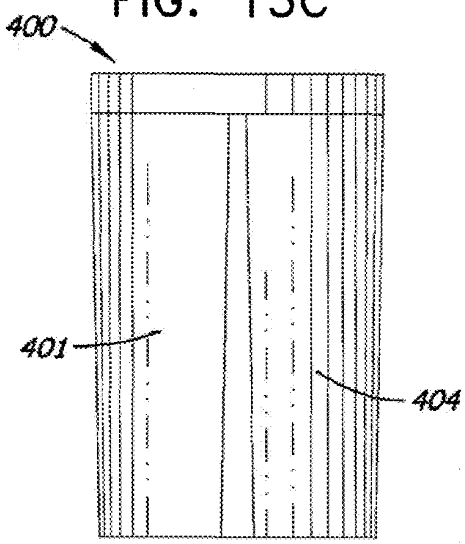

FIG. 13B

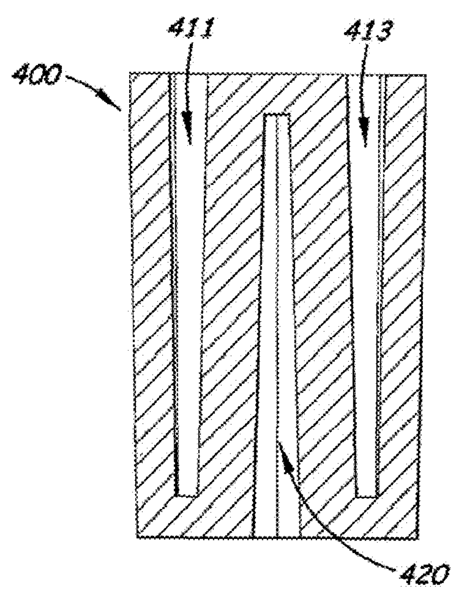

FIG. 13E

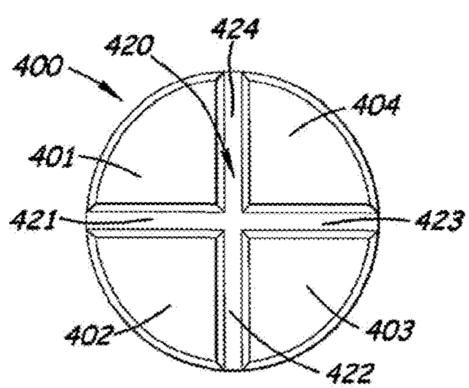

FIG. 13D

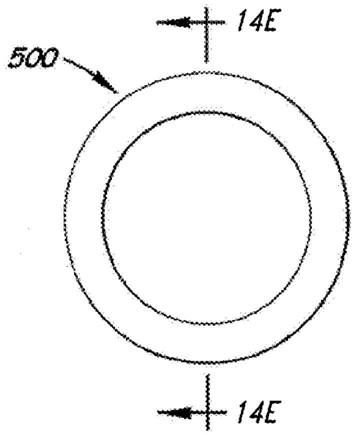

FIG. 14C
(PRIOR ART)

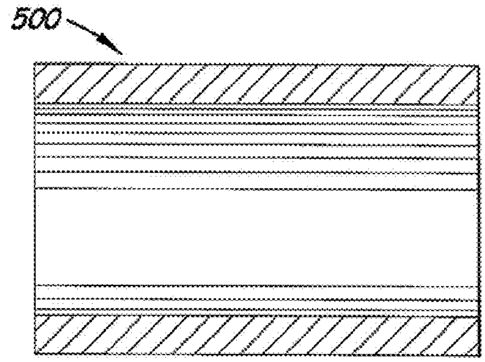

FIG. 14E
(PRIOR ART)

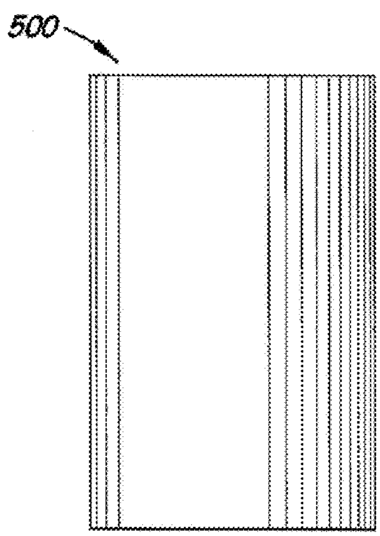

FIG. 14A
(PRIOR ART)

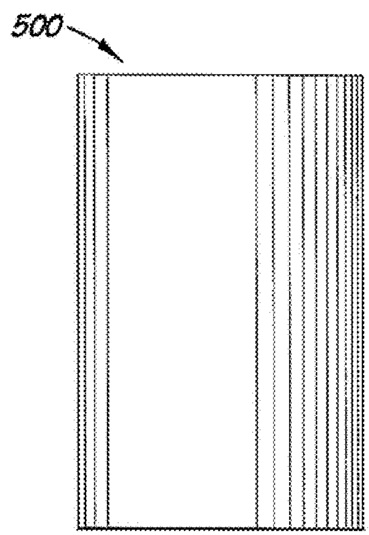

FIG. 14B
(PRIOR ART)

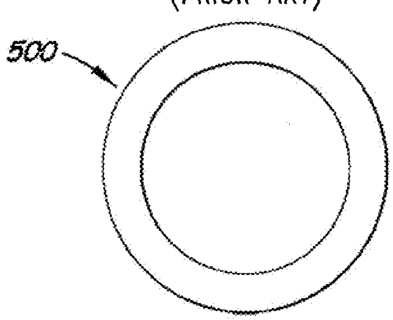

FIG. 14D
(PRIOR ART)

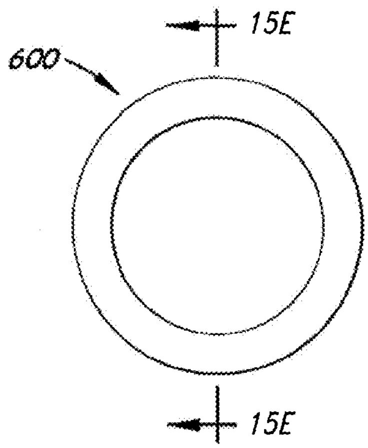

FIG. 15C
(PRIOR ART)

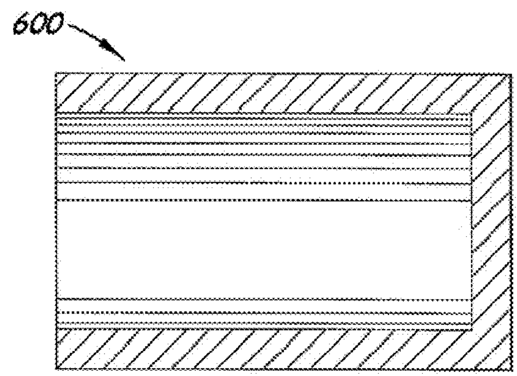

FIG. 15E
(PRIOR ART)

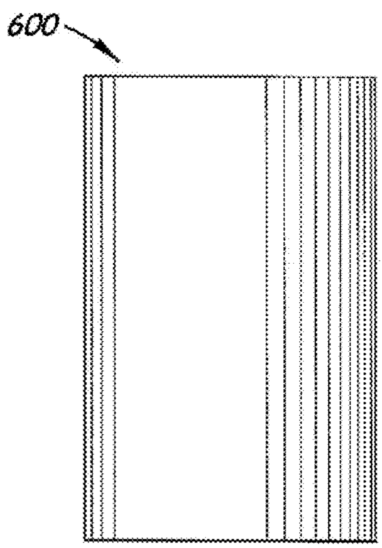

FIG. 15B
(PRIOR ART)

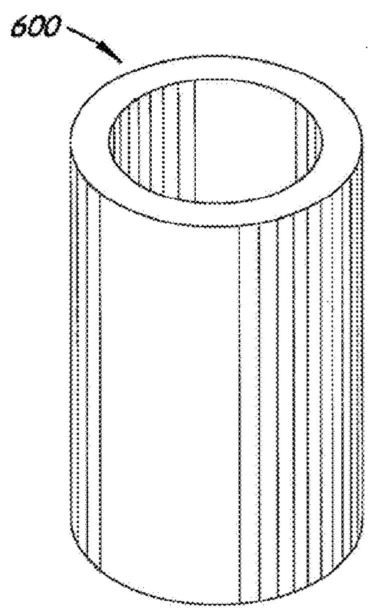

FIG. 15A
(PRIOR ART)

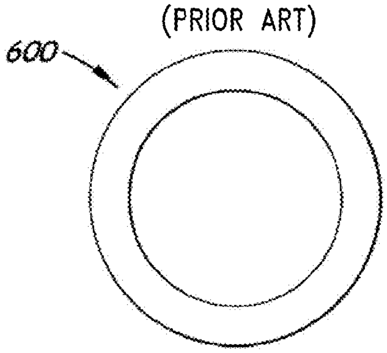

FIG. 15D
(PRIOR ART)

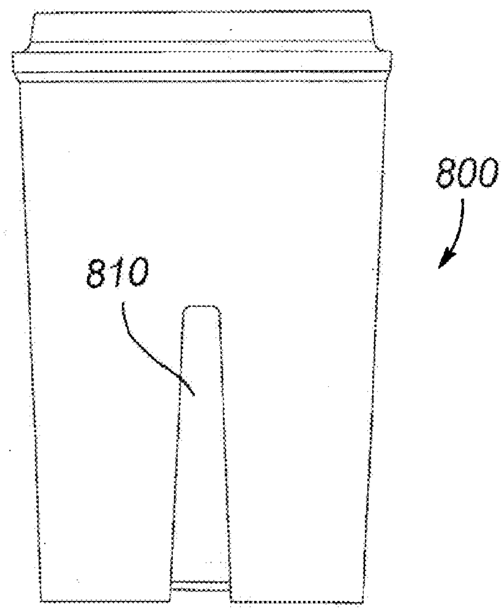

FIG. 16A

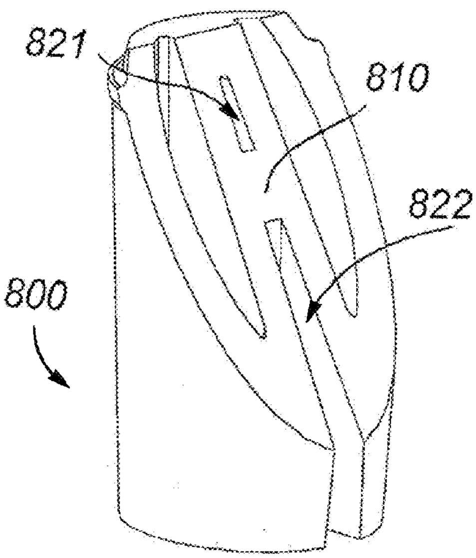

FIG. 16E

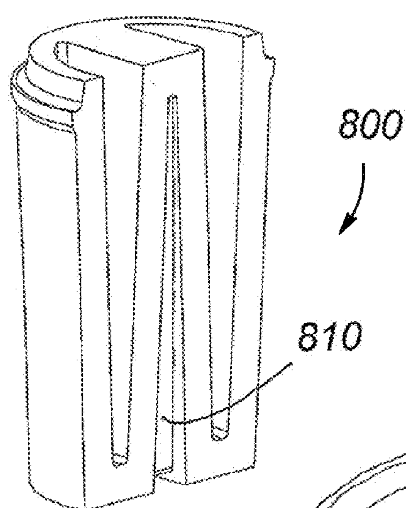

FIG. 16B

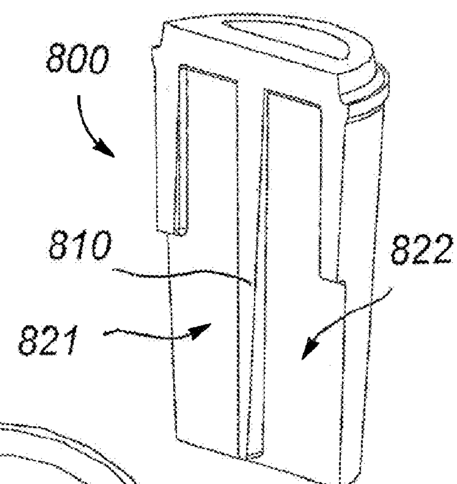

FIG. 16C

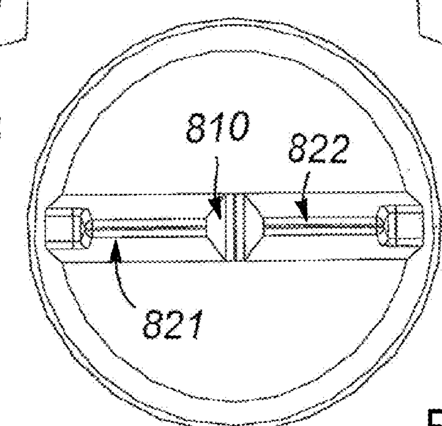

FIG. 16D

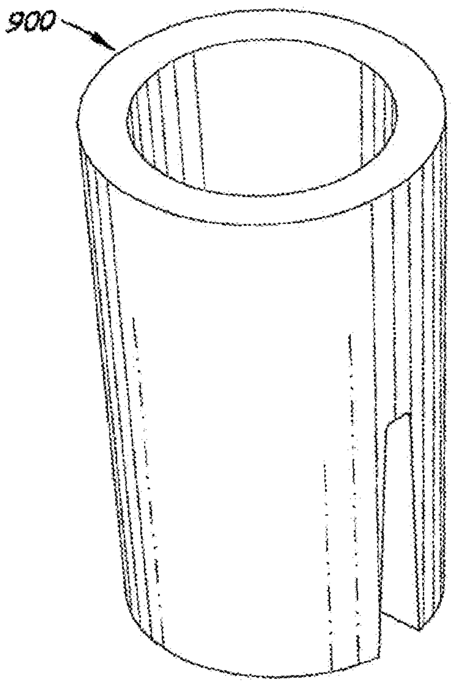

FIG. 17A

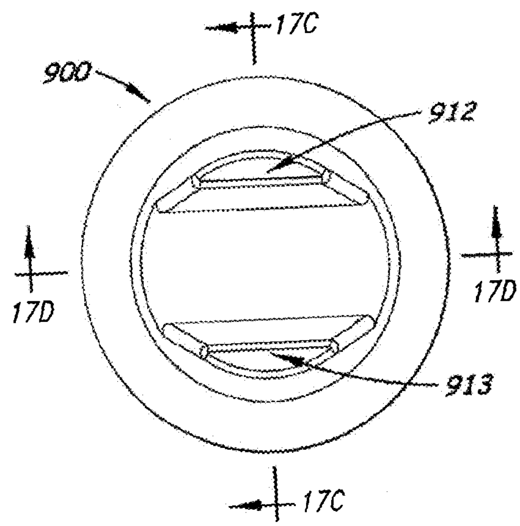

FIG. 17B

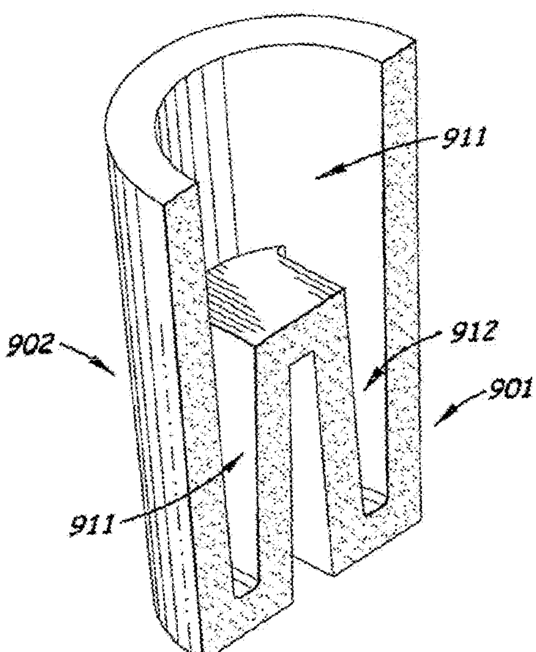

FIG. 17C

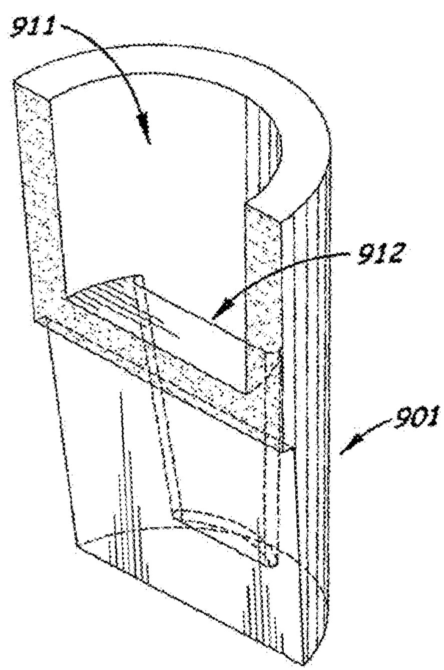

FIG. 17D

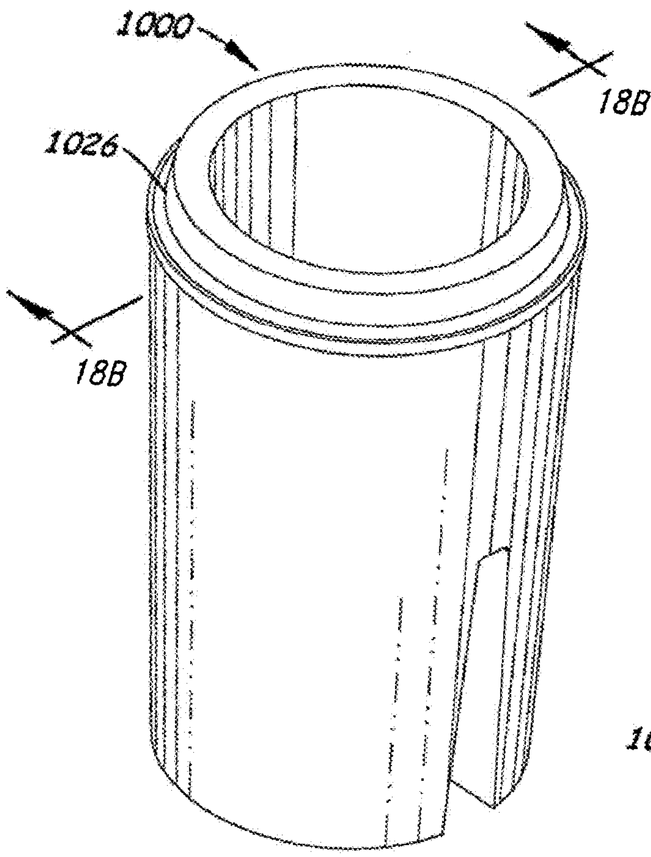

FIG. 18A

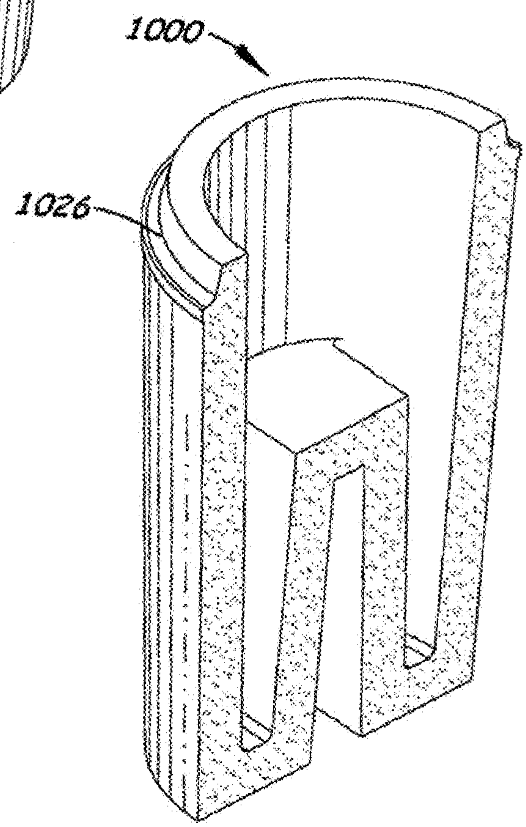

FIG. 18B

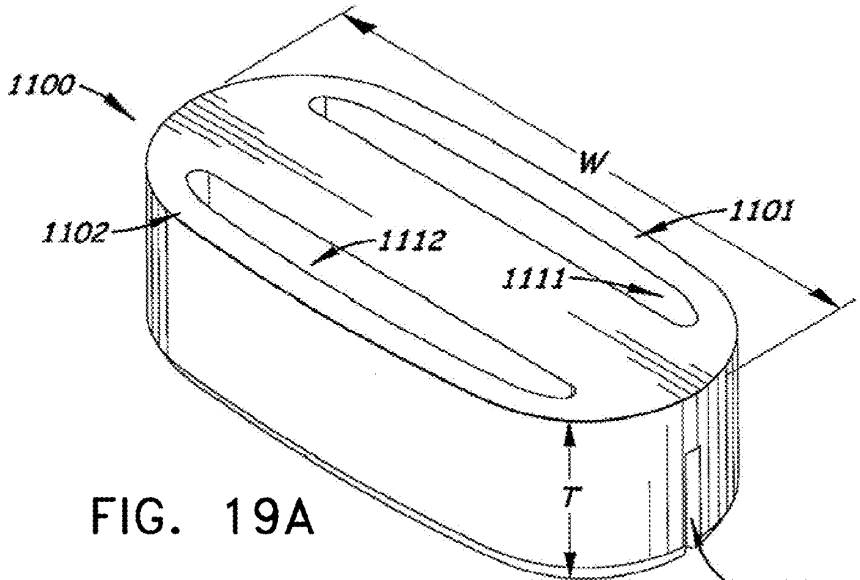

FIG. 19A

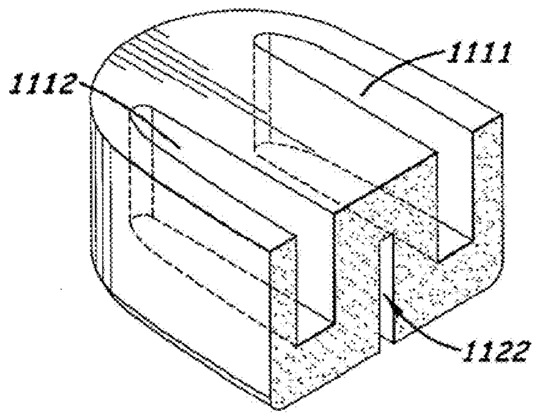

FIG. 19B

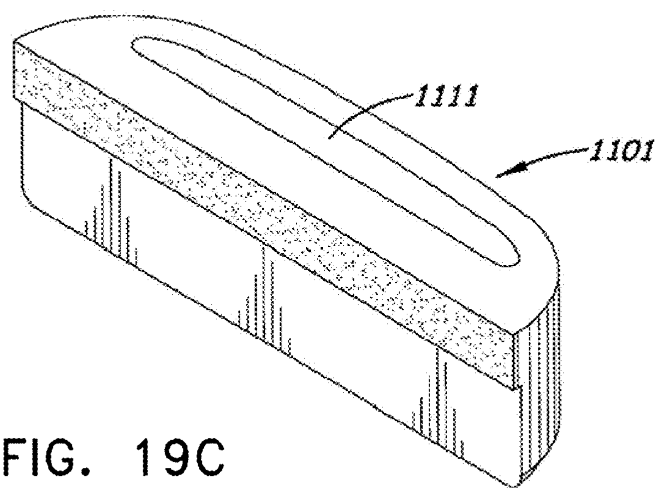

FIG. 19C

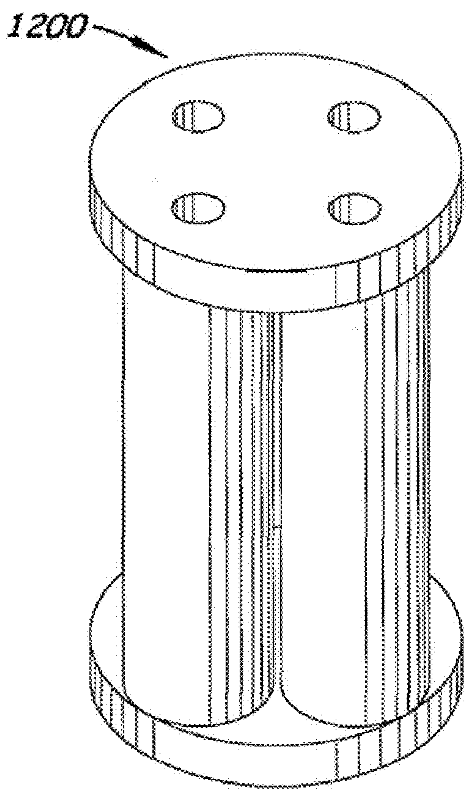

FIG. 20A

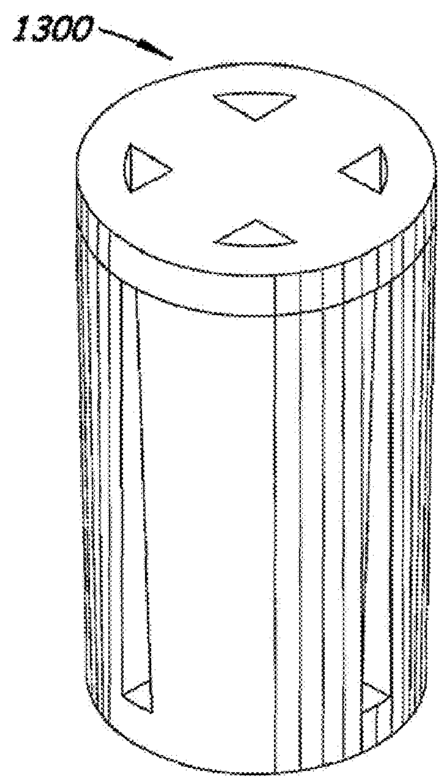

FIG. 20B

2100

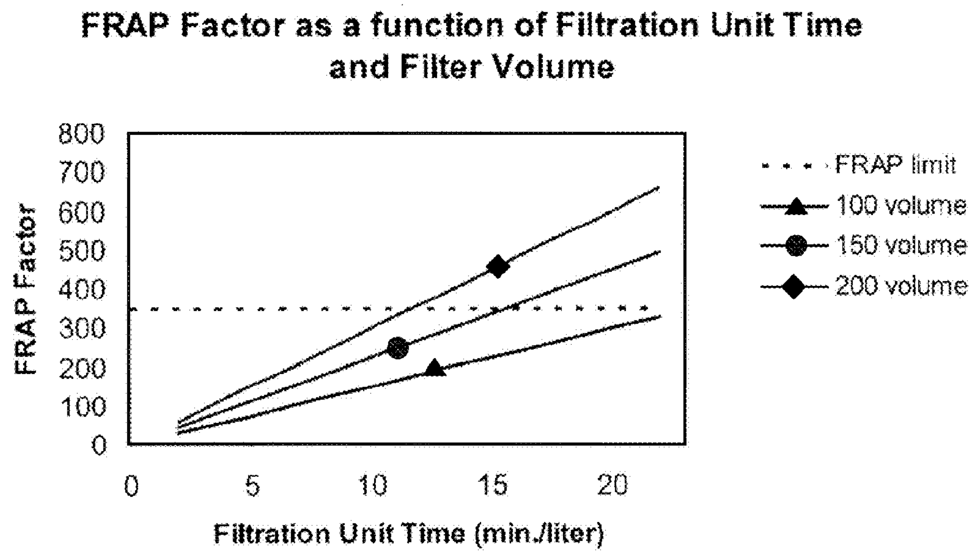

FIG. 21

2200

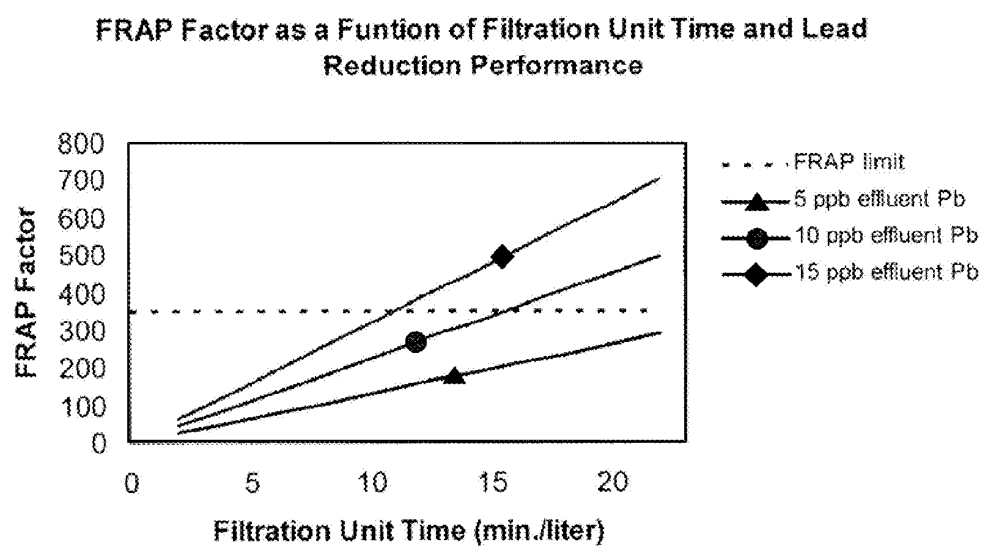

FIG. 22

2300

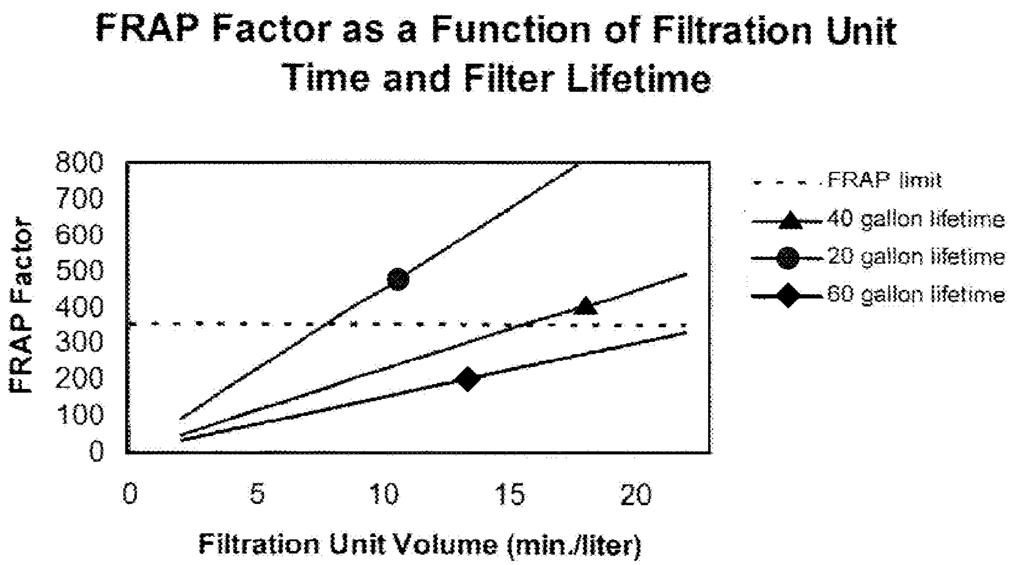
FRAP Factor as a Function of Filtration Unit Time and Filter Lifetime
FRAP Factor
800
700
600
500
400
300
200
100
0
0
5
10
15
20
Filtration Unit Volume (min./liter)
FRAP limit
40 gallon lifetime
20 gallon lifetime
60 gallon lifetime

FIG. 23

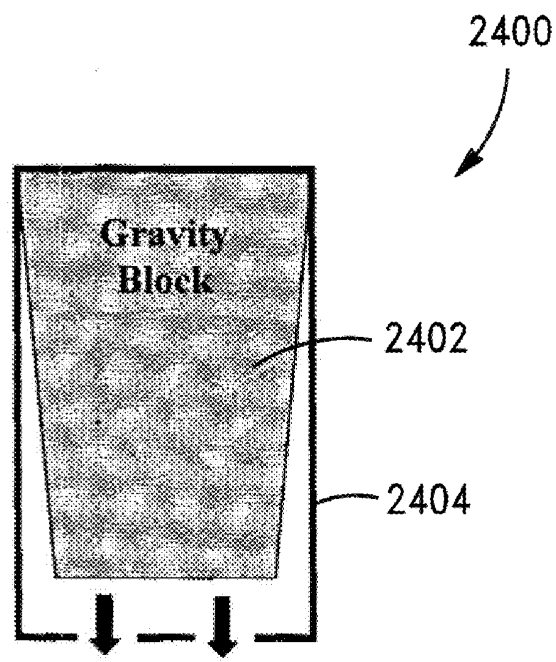

FIG. 24

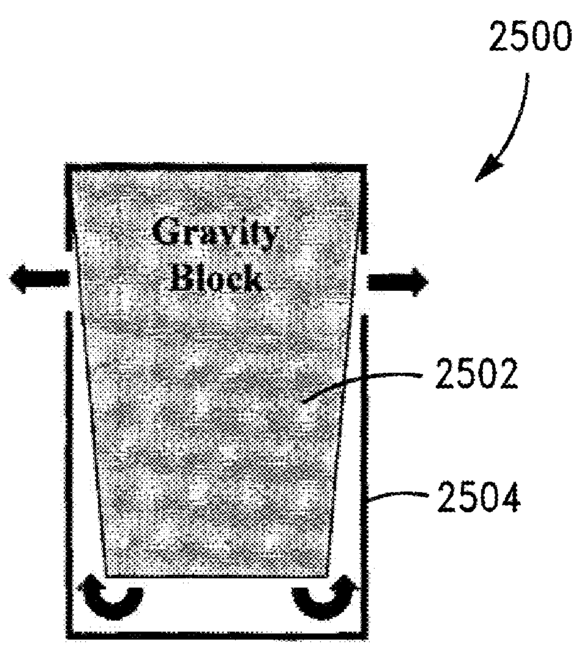

FIG. 25

2600

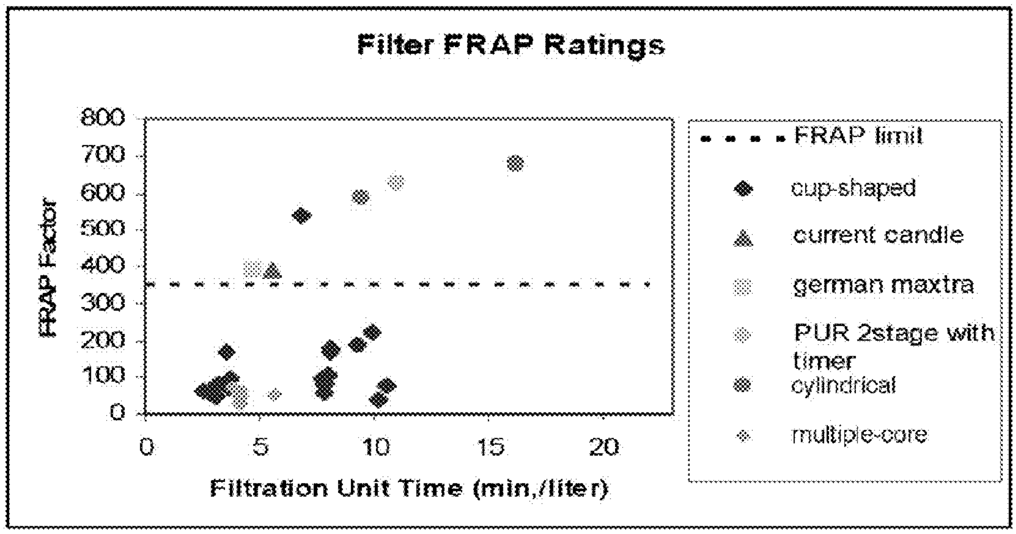

Fig. 26

2700

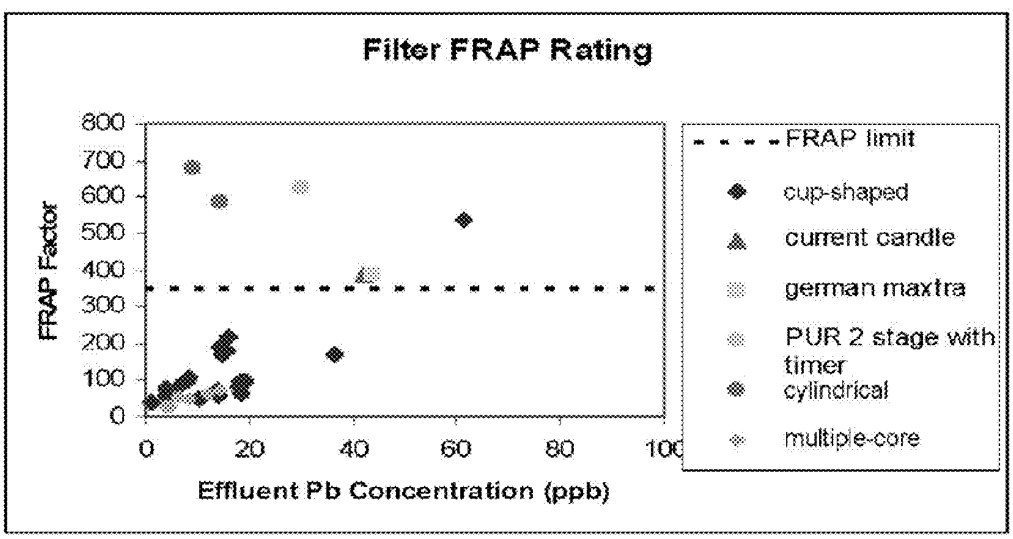

Fig. 27

GRAVITY FLOW FILTER

RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 11/858,765, filed Sep. 20, 2007, which claims the benefit of Provisional Patent Application No. 60/846,162, filed Sep. 20, 2006. This application is continuation-in-part of application Ser. No. 11/927,372, filed Oct. 29, 2007, which is a continuation-in-part of application Ser. No. 10/881,517, filed Jun. 30, 2004 now abandoned.

FIELD OF THE INVENTION

The present invention relates to gravity flow filtration systems, and more particularly, this invention relates to carbon block and granular filters having rapid flow rates and excellent filtration performance.

BACKGROUND OF THE INVENTION

The use of home water treatment systems to treat tap water continues to grow dramatically in the U.S. and abroad, in part because of heightened public awareness of the health concerns associated with the consumption of untreated tap water.

Several different methods are known for filtration of water, and various devices and apparatus have been designed and are commercially available. These methods and devices vary depending on whether the application is for industrial use or for household use.

Water treatment for household use is typically directed to providing safer drinking water. The methods and devices typically used in households for water treatment can be classified into two basic types. One type is a pressurized system, such as a faucet mount system, and typically uses a porous carbon block as part of the filtration system. The other type is a low pressure system, such as a pour-through pitcher system, and typically uses activated carbon granules as part of the filtration system.

Filtration of water in a pressurized system has the advantage of the pressure to drive the filtration through the carbon block and therefore does not usually face problems of achieving desired flow rate while maintaining effective filtration of contaminants. However, when carbon blocks designed for pressurized systems are applied to gravity fed systems, they fail to produce the desired flow rates consistently over time.

Filtration of water in a low pressure system faces the challenge of undesirable contaminants while maintaining a desired high flow rate. However, when carbon blocks designed for pressurized systems are applied to gravity flow systems, they fail to produce the desired flow rates consistently over time.

Gravity flow filtration systems are well known in the art. Such systems include pour-through carafes, water coolers and refrigerator water tanks, which have been developed by The Clorox Company (BRITA®), Culligan™, Rubbermaid™ and Glacier Pure™.

Typically, these systems are filled with tap water from municipal supplies or rural wells, as the user wishes to remove chlorine and/or lead or other contaminants, or to generally improve the taste and odor of the water. These devices continue to be very popular, especially in view of the emphasis on healthy drinking water and in view of the expense and inconvenience of purchasing bottled water.

Prior Filter Blocks

Filter blocks for water filtration comprising granular activated carbon (GAC) and binder, with or without various additives such as lead sorbent, have been commercially available for many years. The raw materials are extruded or compressed into molds to form hollow, cylindrical or "tubular" blocks. Examples of conventional carbon blocks are given in Heskett U.S. Pat. No. 3,538,020, Degen U.S. Pat. Nos. 4,664,683 and 4,665,050, "Amway" U.S. Pat. No. 4,753,728, and Koslow U.S. Pat. Nos. 5,019,311 and 5,147,722 and 5,189,092.

The fluid-flow path through these hollow, cylindrical activated carbon blocks is generally radial. In out-side-in flow schemes, housing structure and internals distribute water to the outer cylindrical surface of the block, and the water flows radially through the inner, cylindrical wall to the hollow axial space at the center axis of the block. From the hollow axial space or perforated tube therein, the filtered water flows out of the filter at either at the bottom end or the top end of the filter, depending upon how the internals and ports have been designed.

These tubular filters have a single outside diameter "OD" (the outer cylindrical wall) and a single inside diameter "ID" (the inner cylindrical wall), with the two diameters defining a wall thickness. The cylindrical volume, minus the hollow space volume, defines the volume of filtering media. These tubular shapes have end surfaces opposing each other axially. These end surfaces are typically sealed to end caps to cause fluid to flow in a radial direction rather than around the end surfaces of the block. The ID, OD, and axial length define the surface areas, volume, and mass of the tubular-shaped activated carbon block. Activated carbon blocks can be varied in outside diameter, inside diameter, and length in order to achieve a specified volume and surface area of media.

The materials used to make radial-flow activated carbon blocks, as shown in the above-referenced patents and as discussed above, are typically carbon particles ranging from 12×30 US mesh to 80×325 US mesh (Koslow states 0.1 to 3,000 micrometers) and thermoplastic or thermo-set binders that are common to the art and disclosed in the referenced patents. Other materials can be blended with the carbon particles and binder particles such as lead-reducing sorbents.

Particle size, wall thickness, surface area, and compression can all be adjusted separately to achieve a desired pressure drop through a filter. Use of smaller carbon particles, increased compression, or thicker walls will generally increase pressure drop and increase contaminant removal. Use of larger carbon particles, less compression, or thinner walls will generally decrease pressure drop and decrease contaminant removal. Larger diameters (OD and ID) for cylindrical blocks will decrease pressure drop by increasing surface area available to the fluid. A large OD carbon block with a small ID will have more pressure drop than the same carbon block with a larger inside ID, as the length of the fluid path through the block is longer.

Corrugated Filter Sheets for Air Filtration

Clapham, in U.S. Pat. No. 3,721,072, produces a low-pressure air filter by providing a monolithic extended surface filter sheet, in the form of a wave pattern. Each wave of the extended surface consists of a peak and a trough extending along the entire length of the filter body to the outside boundary of the filter. ('072 FIG. 1). Clapham's wave forms are much smaller than the overall dimensions of the filter body, for example, thirteen waves in a single filter body, and the filter body is substantially wider and longer than it is thick, for example, typically more than 10 times as long (or at least more than 5 times as long) and also more than 10 times as wide (or at least more than 5 times as wide) as the thickness of the filter body. Therefore, the filter body may be considered a corrugated filter sheet or plate. Clapham's sheet-like or plate-

like filter body may be placed in a frame, extending around the periphery of the filter body, made of "metal, glass, wood, plastic, paperboard, and the like . . . or bonded carbon integral to the filter."

Chapman, in U.S. Pat. Nos. 6,322,615 and 6,056,809, discloses corrugated sheets for air filtration, wherein, as in Clapham, the peaks and troughs extend all the way to the outside boundary of the filter, the wave forms are much smaller than the overall dimensions of the filter body, and the filter body may be considered a corrugated sheet or plate. Methods of making this corrugated filter body comprise rolling the filter material between rollers with multiple V-shaped tools forming the peaks and troughs in the extended surface of the filter body.

Gelderland, et al., in U.S. Pat. No. 6,413,303, disclose activated carbon air filters made of layers of corrugated paper sheets coated in carbon and binder. Insley, et al., in U.S. Pat. No. 6,280,824, disclose polymeric film layers comprising filtration media and each having a corrugated shape. Gelderland, et al. and Insley, et al. each teach flow being through the open spaces defined by the corrugates (parallel to the corrugate troughs), rather than through the corrugated plates (i.e. parallel, rather than transverse, to the plane of each plate).

Granular Activated Carbon Media for Water Filtration

Granular activated carbon (GAC), without binder and with or without various additives such as lead sorbent, has been used in water filtration for years. The granular activated carbon is typically loaded into a compartment inside a filter housing to act as a filter or carbon "bed." The housing and internals are adapted to contain the otherwise-loose granules in place in the compartment, and to distribute water to the inlet of the bed and collect the water at the outlet of the bed. A bed of GAC, with optional other granular media or additives, is the media of choice for low pressure or gravity flow applications, because of the relatively low pressure drop through the bed of granules; no binder is present and, hence, no binder fills the spaces between the carbon granules to interfere with the flow. The interstitial spaces between the granules allow water flow through the bed with good media contact but without the pressure drop that might be expected in a compressed, binder-formed block.

These gravity-flow filtration devices typically feature relatively small, disposable and replaceable filter cartridges that are inserted into the device and used for several weeks of normal use. Examples of these devices and/or of filters that are designed for these devices are disclosed in U.S. Design Pat. No. 416,163, U.S. Design Pat. No. 398,184, U.S. Pat. No. 5,873,995, U.S. Pat. No. 6,638,426, and U.S. Pat. No. 6,290,646. The filters for these devices are entirely or substantially comprised of beds of granular media.

The filtration cartridge typically employed in pour-through (or gravity flow) systems hold blended media of approximately 20×50 mesh granular activated carbon and either an ion exchange resin, which most typically contains a weak acid cation exchange resin, or a natural or artificial zeolite that facilitates the removal of certain heavy metals, such as lead and copper. Weak acid cation exchange resins can reduce the hardness of the water slightly, and some disadvantages are also associated with their use: first, they require a long contact time to work properly, which limits the flow rate to about one-third liter per minute; second, they take up a large amount of space inside the filter (65% of the total volume) and thus limit the space available for activated carbon.

A further problem associated with blended media of granular carbon and ion exchange resin is that they have limited contaminant removal capability due to particle size and packing geometry of the granules. When large granules are packed together, large voids can form between the granules. As water passes through the packed filter bed, it flows through the voids. Much of the water in the voids does not come into direct contact with a granule surface where contaminants can be adsorbed. Contaminant molecules must diffuse through the water in the voids to granule surfaces in order to be removed from the water. Thus, the larger the voids, the larger the contaminant diffusion distances. In order to allow contaminants to diffuse over relatively long distances, long contact time is required for large granular media to remove a significant amount of contaminant molecules from the water.

Conversely, small granules (i.e., 100-150 μm) form small voids when packed together, and contaminants in water within the voids have small distances over which to diffuse in order to be adsorbed on a granule surface. As a result, shorter contact time between the water and the filter media is required to remove the same amount of contaminant molecules from the water for filter media with small granules than for filter media with large granules.

But there are some drawbacks to using filter media with small granules. Water flow can be slow because the packing of the granules can be very dense, resulting in long filtration times. Also, small granules can be more difficult to retain within the filter cartridge housing.

Good flow distribution in the filter is of primary concern in low pressure or gravity flow systems such as in water pitcher devices, water cooler devices, and other systems mentioned above, because flow distribution affects filtration effectiveness and the time at which "breakthrough" of contaminates occurs, and, hence, the time at which the filter should be changed out. As these filtration systems typically do not contain any means for monitoring filtration effectiveness or breakthrough, and, at most, have means for measuring total water that has passed through the filter, it is important that good flow distribution be maintained to maximize use of media, and, hence, to maximize the filtration effectiveness for a given volume of filtered water. If channeling occurs at any time during the filter life, the effectiveness of the filter and/or the effective filter capacity is reduced, and the filtered water quality may drop if the filter is not changed out.

Good water flow rate through the filter is also of primary concern in low pressure or gravity flow water systems such as a water pitcher device, water cooler device, or the like because this affects how quickly filtered water from a freshly-water-filled device may be used. Typically, these devices are kept in the refrigerator or on a countertop, and so their total volume is kept at an amount that is reasonable for such spaces and that is of a reasonable weight to carry. Users of such devices typically do not want to wait a long time for the filtered water. Therefore, reasonable flow rate through the filter is important for customer satisfaction and to gain a competitive edge in the marketplace. As these water filtration devices typically utilize only gravity to force the water through the filters, achieving adequate flowrate of water through the filter is problematic, especially in view of the goal of effective contaminant removal and long filter life. The goal of low pressure drop for high flowrates would drive the design toward short granular filter beds, but the goal of effective contaminant removal and long life without breakthrough would drive the design to in the opposite direction, toward long filter beds. Further, achieving adequate flowrate is also problematic because the carbon-based granular media that are used in the filters in question tend to be slightly hydrophobic. Therefore, while excellent water-media contact is needed for good flow distribution and good flow rates, the media actually tends to resist wetting by the water it is intended to filter.

Therefore, conventional filters for water pitcher devices have typically included GAC beds about 2-6 inches deep. Further, important procedures in the installation of a filter into one of these water pitcher devices are the pre-rinse and the pre-wet steps recommended by manufacturers of the devices and the filters. These procedures involve rinsing the filter and then soaking the fresh filter in water for several minutes prior to inserting the filter into the device. These procedures are explained by the manufacturers as steps that remove carbon fines that may reside in the fresh filter, and that wet the granular or particulate carbon media to achieve better flow distribution and flow rates after the filter is installed in the device.

It is believed that there is room for improvement in the filters used for gravity flow water filtration devices, such as water pitchers, carafes, countertop tanks, and water coolers and other filters that are used for low pressure systems (such as 30 psi or less).

It would be useful to have gravity flow filters that exhibit both good water flow rates and high contaminant reduction.

SUMMARY OF THE INVENTION

A gravity-fed carbon block water filter according to one embodiment of the present invention includes a solid profile filter block comprising multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining a cavity for receiving fluid, and each of the sub-blocks being connected to at least one other of the sub-blocks by filter media of which the filter block is made. The filter media includes about 20-90 wt % activated carbon particles, and about 5-50 wt % binder material, the binder material being interspersed with the activated carbon particles.

In one approach, the water filter may include about 5-40 wt % of additional active material including a lead scavenger. A preferred lead scavenger is a zirconia oxide or hydroxide. The filter may achieve a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where:

V=volume of the filter media (cm^3),

f=average filtration unit time over lifetime L (min/liter),

c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (µg/liter) soluble lead and 30-60 ppb (µg/liter) colloidal lead greater than 0.1 µm in diameter, and

L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).

In another embodiment, a lead concentration in a final liter of effluent water filtered by the filter is less than about 10 µg/liter after about 151 liters? (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion total lead with 30-60 parts per billion thereof being colloidal lead greater than 0.1 µm in diameter.

The water filter preferably has an average flow rate of at least 0.1 liter per minute through the filter with a head pressure of between approximately 0.1 and 1.0 psi.

While many types of binder materials may be used, one binder material is hydrophobic. Also, the binder material has a melt index that is less than 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load. In another embodiment, the binder material has a melt index that is less than 1.0 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load.

In another embodiment, the structure of the filter block is characterized by having been compressed no less than about 10% by volume during fabrication of the filter.

In yet another embodiment, the water filter fits within a container having a volume of less than about 20 in^3. In another embodiment, the filter fits within a container having a volume of less than about 10 in^3.

A gravity-fed carbon block water filter according to another embodiment of the present invention includes a solid profile filter block comprising multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining a cavity for receiving fluid, and each of the sub-blocks being connected to at least one other of the sub-blocks by filter media of which the filter block is made. A lead concentration in a final liter of effluent water filtered by the filter is less than about 10 µg/liter after about 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion total lead with 30-60 parts per billion thereof being colloidal lead greater than 0.1 µm in diameter.

In one approach, the water filter may include about 5-40 wt % of additional active material including a lead scavenger. A preferred lead scavenger is a zirconia oxide or hydroxide. The filter may achieve a Filter Rate and Performance (FRAP) factor of about 350 or less according to the formula above.

The water filter preferably has an average flow rate of at least 0.1 liter per minute through the filter with a head pressure of between approximately 0.1 and 1.0 psi.

While many types of binder materials may be used, one binder material is hydrophobic. Also, the binder material has a melt index that is less than 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load. In another embodiment, the binder material has a melt index that is less than 1.0 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load.

In yet another embodiment, the structure of the filter block is characterized by having been compressed no less than about 10% by volume during fabrication of the filter.

In one embodiment, the water filter fits within a container having a volume of less than about 20 in^3. In another embodiment, the water filter fits within a container having a volume of less than about 10 in^3.

A gravity-fed water filter according to yet another embodiment of the present invention includes filter media including at least activated carbon and a lead scavenger, where the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the formula above.

In another embodiment, the filter achieves a FRAP factor of less than about 200.

In some embodiments, the volume of the filter media (V) is less than about 300 cm^3. In other embodiments, the volume of the filter media (V) is less than about 150 cm^3.

In some embodiments, the average filtration unit time (f) is less than about 12 minutes per liter. In other embodiments, the average filtration unit time (f) is less than about 6 minutes per liter.

In one approach, the filter media is present in the form of a block, which may include a binder material interspersed with particles of the activated carbon. In one embodiment, the binder material has a melt index that is less than 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load. In another embodiment, the binder material has a melt index that is less than 1.0 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load.

The block fits within a container having a volume of less than about 20 in^3. In another embodiment, the block fits within a container having a volume of less than about 10 in^3.

In another embodiment, the block may comprise multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining a cavity for receiving fluid. The block may have an exterior space, gap, or recess between at least a portion of the multiple sub-blocks. In yet another embodiment, the multiple sub-blocks compromises a filter wall surrounding at least four-sides.

In one approach, the block has an open top for receiving unfiltered water into a cavity thereof.

A median sidewall thickness of the block may be less than about 0.6 inch in some embodiments, and less than about 0.4 inch in others.

A structure of the block may be characterized by having been compressed no more than 10% by volume during fabrication of the filter.

In other embodiments, the filter media comprises primarily particles that are not bound together.

A gravity-flow system for filtering water according to an embodiment includes a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water; a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir; and a filter as recited above disposed within the cartridge. In one embodiment, the cartridge has an aperture through a sidewall thereof for allowing at least egress of air into the filtered water reservoir.

Other aspects and advantages of the present invention will become apparent from the following detailed description, which, when taken in conjunction with the drawings, illustrate by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and advantages of the present invention, reference should be made to the following detailed description read in conjunction with the accompanying drawings.

FIG. **1** is a cross-section, side elevation view of a pour-through carafe having a gravity-flow filtration cartridge with a carbon block filter installed therein.

FIG. **2** is a cross-section, side elevation view of an embodiment of a filtration cartridge with a carbon block filter installed therein.

FIG. **3** is a top plan view of the filtration cartridge cover shown in FIG. **2**.

FIG. **4** is a bottom plan view of the filtration cartridge cup shown in FIG. **2**.

FIG. **5** is a cross-section, side elevation view of an inside-out water flow path through the filtration cartridge assembly shown in FIG. **2**.

FIG. **6** is a cross-section, side elevation view of an embodiment of a filtration cartridge having a carbon block filter installed therein.

FIG. **7** is a top plan view of the filtration cartridge cover shown in FIG. **6**.

FIG. **8** is a bottom plan view of the filtration cartridge cup shown in FIG. **6**.

FIG. **9** is a cross-section, side elevation view of an outside-in water flow path through the filtration cartridge shown in FIG. **6**.

FIGS. **10**A-F are a perspective view, a front view, a side view, a top view, a bottom view, and an axial cross-sectional view, respectively, of one embodiment of the invented multi-core block.

FIG. **10**G is a perspective view of the embodiment of FIGS. **10**A-F, with a bead/ring of adhesive added for sealing and end of the filter block to a housing structure.

FIGS. **10**H-J are a side view, a front view and a perspective view of the embodiment of FIGS. **10**A-G, with a hidden structure shown in dashed lines.

FIGS. **10**K and L are perspective cross-sectional views of the embodiment of FIGS. **10**A-J, taken transverse to the plane separating the two sub-blocks of the filter block. FIG. **10**L includes hidden structure in dashed lines.

FIGS. **10**M and N are perspective cross-sectional views of the embodiment of FIGS. **10**A-L, taken along the plane that separates the two sub-blocks of the filter block. FIG. **10**N includes hidden structure in dashed lines.

FIGS. **11**A-F are a perspective view, a front view, a side view, a top view, a bottom view, and an axial cross-sectional view, respectively, of another embodiment of the invented multi-core block.

FIGS. **12**A-F are a perspective view, an axial cross-sectional view, a top view, a bottom view, a front view, and a side view, respectively, of yet another embodiment of the invented multi-core block.

FIGS. **13**A-E, show a perspective view, a front view, a top view, a bottom view, an axial cross-sectional view, respectively, of yet another embodiment of the invented multi-core block.

FIGS. **14**A-E are two opposing side views, a top view, a bottom view, and an axial cross-sectional view of a prior art cylindrical activated carbon filter block.

FIGS. **15**A-E are a perspective view, a side view, top and bottom views, and a cross-sectional view of a cup-shaped filter block.

FIGS. **16**A-E are a front view; a perspective, transverse cross-sectional view (transverse to the plane between the sub-blocks); a perspective cross-sectional view (on the plane between the sub-blocks); a bottom view; and a perspective, cross-sectional view taken diagonally through the filter block, respectively, of an alternate embodiment of the invented filter block. These figures portray one embodiment of a brace or partition provided in the filter block external indentation for strengthening/reinforcing the filter block.

FIGS. **17**A-D are a perspective view, a top view, a first perspective cross-sectional view and a second perspective cross-sectional view, respectively, of another embodiment of the invented filter block, wherein the block comprises a single cavity at its first end, which single cavity opens into (communicates with) two cavities about midway along its length, and wherein this block has no glue recess at its first end but rather a flat end surface for sealing to a housing or internals structure. The cross-sectional view in FIG. **17**C is taken along a transverse plane (perpendicular to the plane that separates the two sub-blocks) and the view in FIG. **17**D is taken on said plane that separates the sub-blocks).

FIGS. **18**A and **18**B are a perspective and a perspective cross-sectional view, respectively, of another embodiment of the invented filter block that is similar to the embodiment of FIGS. **17**A-D except that this block has a glue recess encircling its first end.

FIGS. **19**A-C are a perspective, a perspective transverse (to the plane between the sub-blocks) cross-sectional view, and a perspective cross-sectional view along the plane between the sub-blocks, respectively.

FIGS. **20**A and B illustrate alternate embodiments of the invented multiple sub-block filter blocks comprising indentations into the filter block, wherein the indentations extend into sides of the filter block and not into the bottom of the filter block. Thus, the sub-blocks of these filters are attached/connected, rather than being separated/spaced at their bottom ends.

FIG. **21** is a graphical representation of filter FRAP factors as a function of filtration unit time and volume.

FIG. **22** is a graphical representation of filter FRAP factors as a function of filtration unit time and lead reduction.

FIG. **23** is a graphical representation of filter FRAP factors as a function of filtration unit time and filter lifetime.

FIG. **24** illustrates a representative configuration of a filter set-up having virtually unlimited effluent flow.

FIG. **25** depicts a representative configuration of a filter set-up where the exit point for effluent water is present towards the top of the housing.

FIG. **26** is a chart depicting the FRAP ratings for mixed media filters currently on the market along with cup-shaped and multiple core gravity flow carbon blocks as a function of filtration unit volume.

FIG. **27** is a chart depicting the FRAP ratings for mixed media filters currently on the market along with cup-shaped and multiple core gravity flow carbon blocks as a function of lead reduction performance.

DETAILED DESCRIPTION OF THE INVENTION

The following description is made for the purpose of illustrating the general principles of the present invention and is not meant to limit the inventive concepts claimed herein.

DEFINITIONS

In describing the embodiments of the present invention, the following terms will be employed, and are intended to be defined as indicated below.

The term "activated carbon," as used herein, means highly porous carbon having a random or amorphous structure, and may have such additional or alternative properties as may be presented or implied from the discussion of activated carbon below.

The term "binder," as used herein, means a material that promotes cohesion of aggregates or particles. Many binders may be used, for example, thermoplastic binder, thermo-set binder, etc. The term "binder" thus includes polymeric and/or thermoplastic materials that are capable of softening and becoming "tacky" at elevated temperatures and hardening when cooled. Such thermoplastic binders include, but are not limited to, end-capped polyacetals, such as poly(oxymethylene) or polyformaldehyde, poly(trichloroacetaldehyde), poly (n-valeraldehyde), poly(acetaldehyde), poly(propionaldehyde), and the like; acrylic polymers, such as polyacrylamide, poly(acrylic acid), poly(methacrylic acid), poly(ethyl acrylate), poly(methyl methacrylate), and the like; fluorocarbon polymers, such as poly(tetrafluoroethylene), perfluorinated ethylene-propylene copolymers, ethylene-tetrafluoroethylene copolymers, poly(chlorotrifluoroethylene), ethylene-chlorotrifluoroethylene copolymers, poly(vinylidene fluoride), poly(vinyl fluoride), and the like; polyamides, such as poly(6-aminocaproic acid) or poly(ϵ-caprolactam), poly (hexamethylene adipamide), poly(hexamethylene sebacamide), poly(11-aminoundecanoic acid), and the like; polyaramides, such as poly(imino-1,3-phenyleneiminoisophthaloyl) or poly(m-phenylene isophthalamide), and the like; parylenes, such as poly-p-xylylene, poly(chloro-p-xylylene), and the like; polyarylene oxides; polyarylates; polyaryl ethers, such as poly(oxy-2,6-dimethyl-1,4-phenylene) or poly(p-phenylene oxide), and the like; polysulfones; polyaryl sulfones, such as poly(oxy-1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylene-isopropylidene-1,4-phenylene), poly-(sulfonyl-1,4-phenyleneoxy-1,4-phenylenesulfonyl-4, 4'-biphenylene), and the like; polycarbonates, such as poly (bisphenol A) or poly(carbonyldioxy-1,4-phenyleneisopropylidene-1,4-phenylene), and the like; polyesters, such as poly(ethylene terephthalate), poly(tetramethylene terephthalate), poly(cyclohexylene-1,4-dimethylene terephthalate) or poly(oxymethylene-1,4-cyclohexylenemethyleneoxy-terephthaloyl), and the like; polyaryl sulfides, such as poly(p-phenylene sulfide) or poly(thio-1,4-phenylene), and the like; polyimides, such as poly(pyromellitimido-1,4-phenylene), and the like; polyolefins, such as polyethylene, polypropylene, poly(1-butene), poly(2-butene), poly(1-pentene), poly (2-pentene), poly(3-methyl-1-pentene), poly(4-methyl-1-pentene), and the like; vinyl polymers, such as poly(vinyl acetate), poly(vinylidene chloride), poly(vinyl chloride), polyvinlyl halides, polyvinyl esters, polyvinyl ethers, polyvinyl sulfates, polyvinyl phosphates, polyvinyl amines and the like; diene polymers, such as 1,2-poly-1,3-butadiene, 1,4-poly-1,3-butadiene, polyisoprene, polychloroprene, and the like; polystyrenes; copolymers of the foregoing, such as acrylonitrile-butadiene-styrene (ABS) copolymers, and the like; polyoxidiazoles; polytriazols; polycarbodiimides; phenol-formaldehyde resins; melamine-formaldehyde resins; formaldehydeureas; and the like; co-polymers and block interpolymers thereof; and derivatives and combinations thereof.

The thermoplastic binders further include ethylenevinyl acetate copolymers (EVA), ultra-high molecular weight polyethylene (UHMWPE), very high molecular weight polyethylene (VHMWPE), nylon, polyethers such as polyethersulfone, ethylene-acrylic acid copolymer, ethylene-methacrylic acid copolymer, ethylene-methylacrylate copolymer, polymethylmethacrylate, polyethylmethacrylate, polybutylmethacrylate, and copolymers/mixtures thereof.

The term "low melt index polymeric material," as used herein, means a polymeric material having a melt index less than 1.8 g/10 min., as determined by ASTM D 1238 at 190° C. and 15 kg load. The term thus includes both ultra high and very high molecular weight polyethylene.

The term "colloidal lead" or "particulate lead" as used herein, means lead aggregates or compounds having a size greater than 0.1 μm in diameter. The term "soluble lead" as used herein means lead in ionic form or lead in aggregates or compounds smaller than 0.1 μm in diameter.

The term "incorporating," as used herein, means including, such as including a functional element of a device, apparatus or system. Incorporation in a device may be permanent, such as a non-removable filter cartridge in a disposable water filtration device, or temporary, such as a replaceable filter cartridge in a permanent or semi-permanent water filtration device.

Filter performance can be defined in various ways. For the purposes of the instant invention, good filter performance means some or all of the following:

- Removal of at least 99.95% of particles greater than 3 μm in size from the source water until the water flow rate has been reduced by approximately 75% from an initial water flow rate;
- Reduction of lead concentration to no more than 15 ppb in 80 gallons of source water that has an initial lead concentration of 150 ppb;

Reduction of colloidal lead from a solution containing 45 ppb of colloidal lead and 105 ppb of soluble lead. The effluent concentration of all forms of lead is reduced to less than 15 ppb.

Reduction of chloroform concentration to no more than 80 ppb in 80 gallons of source water that has an initial chloroform concentration of 450 ppb.

Reduction for all challenges is evaluated by measuring the given contaminant concentration in the effluent water collected throughout the testing lifetime of the filter at defined intervals, including but not limited to the initial effluent after filter conditioning, 50%, 100%, 180%, 200% of the claimed filter lifetime.

In general, water moves through gravity flow water filters with head pressures less than 1 pound per square inch (psi). Good flow rates for gravity flow water filters with head pressures in this range are rates faster than about 0.010 liters/min (or about 0.026 gallons/min), and preferably faster than about 0.20 liters/min (or about 0.05 gallons/min). In general, conventional, loose media, gravity-flow carbon filters have flow rates between about 0.125 liters/minute and 0.250 liters/minute. Heretofore known conventional carbon block filters vary in their flow rate performance and, as they are usually used only in faucet-mount systems, are subject to wider ranges of head pressure due to variations in household water pressures than are loose media filters. Typical carbon block filters can have flow rates around 3.5 liters/min (or about 0.75 gallons/min) with head pressures around 60 psi. In general, flow rates of water through most block filters under the low pressure (less than 1 psi) conditions found in gravity flow systems is unacceptably slow.

As will be appreciated by one having ordinary skill in the art, the gravity flow filters described herein have many advantages.

In one embodiment of the invention, a gravity-fed carbon block water filter, described in detail below, generally includes a solid profile filter block comprising multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining a cavity for receiving fluid, and each of the sub-blocks being connected to at least one other of the sub-blocks by filter media of which the filter block is made. The filter media includes about 20-90 wt % activated carbon particles and about 5-50 wt % binder material, the binder material being interspersed with the activated carbon particles.

In another embodiment of the invention, a gravity-fed carbon block water filter includes a solid profile filter block comprising multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining, on at least four sides, a cavity for receiving fluid, and each of the sub-blocks being connected to at least one other of the sub-blocks by filter media of which the filter block is made. A total lead concentration (colloidal and soluble) in a liter of effluent water filtered by the carbon block is less than about 10 μg/liter throughout approximately 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion (ppb) total lead with 30-60 ppb thereof being colloidal lead greater than 0.1 μm in diameter.

In yet another embodiment a gravity-fed carbon block water filter includes activated carbon particles, a binder material interspersed with the activated carbon particles, and a lead scavenger coupled to at least one of the activated carbon particles and binder material, the lead scavenger being for removing lead from water. The filter fits within a container having a volume of less than about 20 in^3. A total lead concentration (colloidal and soluble) in a liter of effluent water filtered by the carbon block is less than about 10 μg/liter throughout approximately 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion total lead with 30-60 ppb thereof being colloidal lead greater than 0.1 μm in diameter. The water has an average flow rate of at least 0.1 liter per minute through the filter with a head pressure of between approximately 0.1 and 1.0 psi.

In a further embodiment of the present invention, a gravity-fed water filter (block or granular) includes filter media including at least activated carbon and a lead scavenger. The filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where:

V=volume of the filter media (cm^3),

f=average filtration unit time over lifetime L (min/liter),

c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (μg/liter) soluble lead and 30-60 ppb (μg/liter) colloidal lead greater than 0.1 μm in diameter

L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).

In yet another embodiment, a gravity-fed carbon block water filter includes activated carbon particles, and a binder material interspersed with the activated carbon particles, wherein the binder material has a melt index that is less than 1.8 g/10 min at 190° C. and 15 kg load. In yet another embodiment, the binder material has a melt index that is less than 1.0 g/10 min at 190° C. and 15 kg load. A structure of the block is characterized by having been compressed less than about 10% by volume during fabrication of the filter. Water passing through the filter has an average flow rate of at least 0.1 liter per minute through the filter with a head pressure of between approximately 0.1 and 1.0 psi.

As alluded to, the aforementioned filters may be implemented in a low pressure or gravity-flow system for filtering water. In general, a gravity-flow system for filtering water may include a container having a source water reservoir that can hold source water and a filtered water reservoir that can hold filtered water; a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir; and a carbon block filter as recited above disposed within the cartridge. An illustrative gravity-flow system for filtering water is shown in FIG. **1**.

Referring to FIG. **1**, there is shown a filter cartridge **10** installed in a pour-through water carafe **1**. The filter cartridge **10** has a carbon block filter **20** inside. In operation, source water W flowing from upper reservoir **11** to lower reservoir **13** is channeled through a plurality of openings (not shown) in cover **12**, directly into interior space **15** of filter cup **14**. Inorganic and organic contaminants are removed from the source water W, as the source water W moves through the filter **20**, thus transforming the source water W into filtered water W'. The filtered water W' flows into cavity **22** of the filter **20** and out through bottom **16** of the filter cup **14** into lower reservoir **13**.

In an alternate embodiment, source water W flowing from the upper reservoir **11** to the lower reservoir **13** is channeled through a plurality of openings (not shown) in the cover **12**,

directly into the filter cavity **22**. Inorganic and organic contaminants are removed from the source water W, as the source water W moves through the filter **20**, thus transforming the source water W into filtered water W'. The filtered water W' flows from the filter **20** directly out through the bottom **16** of the filter cup **14** and into the lower reservoir **13**.

Although a pour-through carafe has been used to illustrate the filter **20**, the filter **20** can be employed in combination with any water pitcher, bottle, carafe, tank, water cooler or other gravity-flow filtration system. The embodiments of the invention should thus not be construed as being limited in scope to filtering water only in pour-through carafes.

Further, multiple filters may be present in a single device, such as the aforementioned water pitcher, bottle, carafe, tank, water cooler or other gravity-flow filtration system. The filters may have the same construction, shape, and/or properties; or may be different. The filters may be arranged for concurrent flow (e.g., to increase filtering speed), and/or may filter the fluid in stages (e.g., one filter acts as a prefilter). Advantages of embodiments having two filters include increased flow rates, decreased frequency of filter changes, etc.

The filter **20** can contain activated carbon that is bonded with a binder to form an integrated, porous, composite, carbon block. The activated carbon can be in the form of particles or fibers. In some embodiments, the filter **20** includes at least one additional active material, such as ceramic or zeolite particles. The active material(s) can also be bound together with the carbon and the binder within the porous composite block.

Several potential filter materials are described below. While the discussion will tend to focus on block filters, it should be understood that the various materials may be used in granular or "loose media" type filters, according to various embodiments of the present invention.

Activated Carbon

Activated carbon from any source can be used, such as that derived from bituminous coal or other forms of coal, or from pitch, bones, nut shells, coconut shells, corn husks, polyacrylonitrile (PAN) polymers, charred cellulosic fibers or materials, wood, and the like.

Activated carbon granules can, for example, be formed directly by activation of coal or other materials, or by grinding carbonaceous material to a fine powder, agglomerating it with pitch or other adhesives, and then converting the agglomerate to activated carbon. Different types of activated carbon can be used in combination or separately, e.g., 90% coconut carbon and 10% bituminous carbon.

In one embodiment of the invention, the mesh size of the activated carbon is approximately 80×325 U.S. mesh. Illustrative carbon particle size distributions are as follows:

80×325 Activated Carbon (d(0.1)=18.6 um, d(0.5)=87.1 um, d(0.9)=191.3 um)

80×325 Activated Carbon (d(0.1)=15.5 um, d(0.5)=73.8 um, d(0.9)=154.3 um)

In another embodiment of the invention, the mesh size of the activated carbon is approximately 80×200 U.S. mesh.

In yet another embodiment of the invention, the mesh size of the activated carbon is approximately 50×200 U.S. mesh.

In some arrangements, the activated carbon has an average particle size such that it can pass through a screen of 350 mesh or less (e.g., an average particle size of less than about 350 mesh-about 40 μm). In one arrangement, the activated carbon has a mean particle size in the range of 70-220 μm. In another arrangement, the activated carbon has a mean particle size in the range of 70-90 μm.

In another embodiment of the invention, the carbon content is in the range of approximately 20-90%, by weight. In an alternative embodiment, the carbon content is in the range of approximately 30-80%, by weight. In yet another embodiment, the carbon content is in the range of approximately 30-50% by weight.

Binder

The binder can contain any of the aforementioned binder materials. The binder can be a low melt index polymeric material, as described above. In other arrangements, the binder can contain a higher melt index material, that is, a material with a melt index that is greater than 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load. Preferred binders are also hydrophobic.

Low melt index polymeric materials having a melt index less than approximately 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load, such as VHMWPE or UHMWPE, are well known in the art. Low melt index binders do not flow easily when heated, but become only tacky enough to bind granules together without covering much of the surface of the granules.

In some arrangements, binder materials that have high melt index values, that is, melt indices greater than those of VHMWPE or UHMWPE, such as poly(ethylene-co-acrylic acid) or low density polyethylene, can also be used. Even though high melt index materials can tend to melt and flow when heated, careful choice of binder particle size and processing conditions can make these materials very effective for forming porous composite blocks for water filtration. These binders and their use in water filtration have been disclosed by Taylor et al. in U.S. patent application Ser. No. 10/756,478, filed Jan. 12, 2004, which is included by reference herein.

As will be appreciated by one having ordinary skill in the art, the type of binder used to construct the filter **20** can affect the initial flow rate of water through the filter, since carbon is more hydrophilic than most binders or other actives. Initially, the filter **20** is dry and when it is placed in contact with water, it may or may not absorb the water readily and thus allow for immediate water flow. Filters made with UHMWPE or VHMWPE with a low melt index tend to absorb water more readily than filters made with EVA or LDPE. Also, by maximizing the available surface area of the carbon, one can achieve a carbon block that is hydrophilic and readily absorbs water. As a result, binders that neither flow nor deform significantly when melted, but simply become tacky, maximize the available carbon surface area and thus maximize the water absorptivity of the carbon block. Other binders that have a tendency to melt during processing can also provide a large available carbon surface area when they have very small particle sizes.

In order to minimize the amount of carbon particle surface area covered/blocked by binder, especially-preferred binders comprise at least one binder having less than or equal to 10 g/min melt index, or, more preferably, 0.1-10 g/min melt index and especially 1-10 g/min melt index by ASTM D1238 or DIN 53735 at 190 degrees C. and 15 kilograms. Binders from these ranges may be selected that become tacky enough to bind the media particles together in a solid profile, but that maintain a high percentage of the media particle surface area uncovered/unblocked and available for effective filtration. Further, binders from these ranges may be selected that leave many interstitial spaces/passages open in the solid profile; in other words, it is desirable to have the binder not completely fill the gaps between media particles. With binders in these ranges, blocks have been made according to embodiments of the invention that have excellent pressure drop. It is believed that this excellent, low pressure drop results from the various block shapes and the porosity and high amount of interstitial spaces and passages through the solid profile. A high amount of porosity is desirable, and, when combined with the high

amount of "bulk" surface area for the block (bulk surface area meaning the exposed surfaces of the block, including the cavities described above), the preferred embodiments are effective in delivering fluid to the media of the block, effective in fluid flow through the porous block, and effective in fluid flow out of the media in the block.

In one embodiment, the binder content is in the range of approximately 5-50%, by weight. In another embodiment, the binder content is in the range of approximately 20-45%, by weight. In yet another embodiment, the binder content is in the range of approximately 35-40% by weight.

In one embodiment of the invention, the binder particles are in the range of approximately 5-150 μm. In an alternative embodiment, the binder particles are in the range of approximately 100-150 μm. In another embodiment, the binder particles are approximately 110 μm.

Actives

One or more additional active materials (or actives) can be included in the carbon block filter. The active(s) can contain ceramic particles, zeolite particles, zirconia, aluminosilicate, silica gel, alumina, metal oxides/hydroxides, inert particles, sand, surface charge-modified particles, clay, pyrolyzed ion-exchange resin, silver, zinc and halogen based antimicrobial compounds, acid gas adsorbents, arsenic reduction materials, iodinated resins, and mixtures thereof.

In one embodiment, the actives constitute between about 0.01 wt % and 70 wt % of the porous composite block. In other arrangements, the actives constitute between about 10 wt % and 40 wt % of the porous composite block. In another arrangement, the actives constitute between about 20% and 30%, by weight, of the porous composite block.

In one embodiment of the invention, the actives have a mean particle size in the range of approximately 10 to 100 μm. In another embodiment, the actives have a mean particle size in the range of approximately 20-70 μm. In an alternative embodiment, the actives have a mean particle size in the range of approximately 1 to 50 μm.

Preferred actives include lead scavengers, e.g., lead sorbents, or arsenic removal additives. Illustrative lead scavengers include metal ion exchange zeolite sorbents such as Engelhard's ATS™ and aluminosilicates such as Selecto Scientific's Alusil™. Particularly preferred lead scavengers are zirconia oxides and hydroxides. Lead scavengers may be present in the amounts recited above for actives in general. A preferred range of lead scavenger content is about 5-40% by weight.

Filter Cartridge/Filter Assemblies

Filter blocks presented herein can be employed in most, if not all, gravity-flow filtration cartridges adapted to receive same. FIG. **2** is a schematic cross section of a filter housing or cartridge **10** that contains a porous composite carbon block filter **20**, according to an embodiment of the invention. The cartridge includes a cover **12** and a cup **14**. The cover **12** can be attached to the cup **14** after the filter **20** is placed inside the cup **14**. Within the interior space of the cartridge **10** there is an outer space **15** outside the porous composite carbon block **20** and an inner space or cavity **22** within the bore of the porous composite carbon block **20**. The cover **12** includes a plurality of entrance openings **17***a* near the center of the cover **12**. The entrance openings **17***a* are adapted to allow water to enter into the inner space **22**. The bottom **16** of the cup **14** includes a plurality of exit openings **18***a*. The exit openings **18***a* are adapted to allow water to exit from the outer space **15** and/or the porous composite carbon block **20**. The cartridge may have an aperture **40** through a sidewall thereof for allowing at least egress of air into the treated water compartment. A flange **42** may also be present to channel the unfiltered water into the cavity **22** of the composite block **20**.

FIG. **3** is a top view of the cover **12** of the filter cartridge **10** of FIG. **2**, showing an exemplary embodiment of the invention. In this example, the entrance openings **17***a* are shown grouped near the center of the cover **12**. Although the entrance openings **17***a* are shown as round holes arranged in a square array, it will be appreciated that other opening shapes, such a slots or slits and other arrangements of the openings, can be employed.

FIG. **4** is a bottom view of the cup **14** of the filter cartridge **10** of FIG. **2**, showing an exemplary embodiment of the invention. In this arrangement, the exit openings are distributed in a circle concentric to an outer edge **19** of the cup bottom **16**. Although the exit openings **18***a* are shown as round holes, it will be appreciated that other shapes, such a slots or slits, can be employed.

FIG. **5** is a schematic cross section showing a water flow path through the filter cartridge **10** and the carbon block filter **20**. When the cap **12** is exposed to a body or flow of source water W, the source water W flows into and through the entrance openings **17***a* in the cap **12**, and enters into the inner space **22** of the filter **20**. The water W then flows through an interior wall **21***a* of the filter **20**, out an exterior wall **21***b* of the filter **20**, and into the outer space **15**. In passing through the filter **20**, the source water W becomes purified water W'. The purified water W' exits the filter cartridge **10** through the exit openings **18***a*.

FIG. **6** is a schematic cross section of a filter housing or cartridge **30** that contains a porous composite carbon block filter **20**, according to another embodiment of the invention. The cartridge includes a cover **32** and a cup **34**. The cover **32** can be attached to the cup **34** after the filter **20** is placed inside the cup **34**. Within the interior space of the cartridge **30** there is an outer space **35** outside the porous composite carbon block **20** and an inner space **22** within the bore of the porous composite carbon block **20**. The cover **32** includes a plurality of entrance openings **17***b* near the periphery of the cover **32**. The entrance openings **17***b* are adapted to allow water to enter into the inner space **22**. The bottom **36** of the cup **34** includes a plurality of exit openings **18***b*. The exit openings **18***b* are adapted to allow water to exit from the outer space **35** and/or the porous composite carbon block **20**.

FIG. **7** is a top view of the cover **32** of the filter cartridge **30** of FIG. **6**, showing an exemplary embodiment of the invention. In this arrangement, the entrance openings are distributed in a circle concentric with an outer edge **38** of the cover **32**. Although the entrance openings **17***b* are shown as round holes arranged in a square array, it will be appreciated that other opening shapes, such a slots or slits and other arrangements of the openings, can be employed.

FIG. **8** is a bottom view of the cup **34** of the filter cartridge **30** of FIG. **6**, showing an exemplary embodiment of the invention. In this example, the exit openings **18***b* are shown as grouped near the center of the cup bottom **36**. Although the exit openings **18***b* are shown as round holes, it will be appreciated that other shapes, such a slots or slits, can be employed.

FIG. **9** is a schematic cross section showing a water flow path through the filter cartridge **30** and the carbon block filter **20**. When the cap **32** is exposed to a body or flow of source water W, the source water W flows into and through the entrance openings **17***b* in the cap **32** and enters into the outer space **35** of the filter **20**. The water W then flows through an exterior wall **21***b* of the filter **20**, out an interior wall **21***a* of the filter **20**, and into the inner space **22**. In passing through the

filter **20**, the source water W becomes purified water W'. The purified water W' exits the filter cartridge **30** through the exit openings **18***b*.

Additional components and features may also be present, such as filter sheets, as described in U.S. patent application Ser. No. 10/881,517 to Rinker et al., which is herein incorporated by reference.

Filter Block Shapes and Dimensions

Block filters can have many shapes, such as cylinders, sheets, solids, cubes, parallelepipeds, etc. Illustrative shapes are presented below.

Factors influencing the final dimensions of a filter block include the dimensions of the cartridge housing the filter block, desired properties and efficacy of the filter, etc.

The wall thickness and the external surface area of the carbon block filter can influence the flow rate of water through the filter. In one embodiment, the median wall thickness is in the range of approximately 0.15 in. to 0.60 in. In other arrangements, the wall thickness is less than about 0.40 in., e.g., approximately 0.20 in. to 0.40 in. The filter block can have an outside diameter between about 1.5 in. to 4.0 in., and a length between about 1.0 in. to 4.0 in.

For most portable gravity-fed systems, a smaller size of the filter block is preferred. In preferred embodiments, the filter block will provide many of the benefits presented herein, and yet fit within a container having a volume of less than about 24.4 in^3 (400 cm^3), and more preferably less than about 20 in^3. In more preferred embodiments, the filter block will provide many of the benefits presented herein, and yet fit within a container having a volume of less than about 10 in^3. In an illustrative embodiment, the filter block fits within a container having a volume of about 8.6±0.5 in.

Similar container dimensions may also be used for embodiments of the present invention that are based on granular media.

The foregoing dimensions may or may not match the actual container (e.g., cartridge shell) housing the filter block or granular media as sold.

Preferred embodiments of the invention seek to maximize the volume of a filtration media block media in a given cartridge or housing total volume, while decreasing pressure drop. Each single filter block is preferably three-dimensional, with three dimensions that are of the same order of magnitude, and each single filter block according to the invention may be considered to comprise multiple, substantially separate but connected, filtration units or "cores" and, most preferably, to comprise multiple filter sub-blocks. This multiple sub-block structure is preferably accomplished by providing a block with multiple cavities, wherein each cavity, defined by a cavity surface(s), extends deep into the block. The multiple cavities allow water to flow deep inside the filter block to access the media of the sub-block (in the case wherein the cavities are at the inlet to the block) or that allows water to be collected from each filtration sub-block (in the case wherein the cavities are at the outlet from the block). The cavities may be D-shaped, circular, triangular, polygonal, or other shapes in cross-section or in end-view. These cavities may be described as internal or interior cavities, whether they are used for fluid-inlets (in inside-out flow) or fluid outlets (in outside-in flow), as they are generally inside the block, rather than on the outer surface of the block.

The blocks preferably also comprise an exterior or external cavity in the outer surface of the block to separate portions of the sub-blocks to provide a space between exterior surfaces of said portions of the sub-blocks (said exterior surfaces "facing" the exterior cavity) for fluid access out of or into said sub-blocks. Such an exterior cavity, in an inside-out flow-scheme, may allow fluid to flow out of each sub-block toward the exterior cavity for collection and flow out of the filter cartridge or housing. Such an exterior or external cavity, in an outside-in flow-scheme, may allow fluid to flow into each sub-block from said exterior cavity. This way, substantially all of the filter media of a sub-block is accessible to fluid for filtration, rather than just the media near the outer circumference of the block.

Embodiments comprising multiple-core, multiple-cavity, and/or multiple-sub-block solid profile filter media will work with many different block sizes; for example, large and small, and long and short block shapes. The preferred blocks may be considered three-dimensional rather than sheet-like or substantially two-dimensional. The filter blocks of the preferred embodiments comprise activated carbon block consisting of activated carbon particles/granules and binder particles that are formed to contain multiple sub-blocks, with a preferred additive being lead sorbent such as Alusil™ or ATS™ or arsenic removal additives. Optionally, instead of, or in addition to, carbon particles/granules, activated carbon fibers may be used with binder to connect them and hold them in the solid profile. Also, other filtration or treatment media may be used, in place of or in addition to, activated carbon.

Preferably, the opening of each cavity is located at a common first axial end, and the sub-blocks extend from that common end generally parallel to each other but preferably clustered around, or arranged symmetrically around, the center axis of the block rather than on a single plane. One or more exterior cavities may be located, for example, at or near the central axis of the block, at the opposite, second axial end, for separating the sub-blocks at or near the second axial end.

Alternatively, embodiments according to the invention may include a single cavity that, farther along the axial length, branches into multiple cavities. The opening of the single cavity is located at a first axial end of the block, the multiple cavities begin at some point or points along the length of the block, and the closed ends (or capped ends) of the multiple cavities typically lie at the second axial end opposite the single cavity opening. One or more exterior cavities may be located, for example, at or near the central axis of the block at the second end, for separating the sub-blocks at or near the second end.

Alternatively, embodiments may include a first set of multiple cavities at one end of the block, branching into different numbers or shapes of multiple cavities contained within a second set of the cavities generally midway along the length of the block. The openings of the first set of multiple cavities are located at a first axial end of the filter and the closed or capped ends of the second set of cavities is typically at the opposite end of the filter block. One or more exterior cavities may be located, for example, at or near the central axis of the block at the second end, for separating the sub-blocks at or near the second end.

Referring to FIGS. **10**A-N, **11**A-F, **12**A-F, **13**A-F, **16**A-E, **17**A-D, **18**A-B, and **19**A-C, there are shown several, but not the only, embodiments of a multiple-core filter block, along with a hollow, cylindrical filter block in FIGS. **14**A-E and a cup-shaped filter block in FIGS. **15**A-E, also embodiments of the present invention.

The overall shape of the filter block may or may not be cylindrical (round in cross-section or end-view) and, instead may be square, oval, triangular, or other shapes in cross-section and/or in end-view. The filter block may be considered a three-dimensional solid profile, which has three dimensions that are preferably on the same order of magnitude. For example, preferred embodiments may be dimensioned to have an axial length within the range of ⅓-10 times the

diameter of the filter block, more preferably ⅓-5 times the diameter, and most preferably 1-5 times the diameter. For these calculations, the largest diameter of the block may be used, as many of the blocks are tapered in diameter. In non-cylindrical blocks, the axial length is preferably within the range of ⅓-10 times the width, more preferably ⅓-5 times the width, and most preferably, 1-5 times; and within the range of ⅓-10 times the depth, more preferably ⅓-5 times the depth, and most preferably, 1-5 times the depth.

Also, the shape of each of the filtration sub-blocks, connected together into the single solid block, may be cylindrical, conical, or square, oval, triangular, or other shapes in cross-section. The multi-core filter blocks, which are preferably made substantially of activated carbon, sorbents, powders, and/or carbon or other fibers, are bound together sufficiently to maintain the solid profile. The multi-core shape serves to increase surface area and volume of material that is active for filtration and contaminant removal. The multi-core filter block comprises a plurality of sub-blocks, each of which comprises a filter wall surrounding at least four sides, and preferably five sides, of an interior hollow cavity or space. In other words, multiple filter walls connect to each other, so that each cavity is surrounded on all four sides and, optionally, at one of its ends (fifth side). Note that the "four sides" are used representatively to describe enclosure on all sides surrounding a given axis, but not necessarily the ends, and so should be construed to encompass embodiments not traditionally having four sides, such as triangles, cylinders, etc. The filter walls defining the sub-blocks may connect to each other all the way to the end of the block, or, there may be one or more cavities separating the sub-blocks along at least a part of the sub-blocks, such a slots, holes, or other shapes of exterior cavities.

The preferred configurations include at least one end of each cavity being closed, preferably by additional filter wall that extends radially. This radial filter wall has a thickness sufficient to close, and, in effect, to "seal" each cavity, and/or to properly filter any fluid that passes through it. With the radial filter wall at least as thick as the axial filter walls, the fluid will tend to flow radially through the generally-axial filter walls, but, if the fluid does flow axially through the radial filter wall, the fluid will be appropriately filtered. In most embodiments, the cavity walls that create the inside surface areas do not protrude through the entire length of the block shape and so the radial filter wall, instead of a housing plate or cap, serves to close one end of the cavities. In less-preferred embodiments wherein the cavities protrude through the entire length of the block shape, an additional sealing plate, or cap may be used to maintain radial flow through the axial filter walls.

The activated carbon block shapes shown in FIGS. **10**A-N through **13**A-F have shapes that can be described as a multiple cavity mold. The filter block **100** in FIGS. **10**A-F may be described as a "two-core" or "two-sub-block" filter block, wherein each of the two sub-blocks **101**, **103** may be called generally semi-cylindrical or a generally D-shaped sub-block. Also, filter block **100** is preferably provided with a tapered outer axial surface **102** outer diameter from larger at the top end to smaller at the bottom end, and having two generally D-shaped cavities **104** extending axially in the block. The cavities **104** have D-shaped openings **106**, both at the top end, with the cavity preferably maintaining generally a D-shape throughout the length of the cavity, but with the size of the cross-sectional D-shape becoming smaller toward the bottom end of the cavity in view of the preferred slanted inner walls or cavity surfaces **108**. Preferably both "sides" of the cavity wall (**108**, **108'**) are slanted/tapered, to ease removal from the mold. An exterior cavity in the form of slot

112 extends into the bottom outer surface of the block creating a slot surface portion **114** of the outer surface of the block, further separating the two sub-blocks and providing access for water in between the sub-blocks (either water entering the block from the outside of the block (outside-in flow) or water exiting the block (inside-out flow).

A lip, depression, or other ring structure **116** preferably surrounds the top end of the block, as a recess for receiving adhesive for sealing the top end of the filter to a housing, thus, preventing water from bypassing around the top end of the filter. The block structure, combined with the adhesive or other seal, may eliminate the need to place a plastic plate at the top end of the filter. This way, water flow may be controlled, for example, in the case of inside-out flow, the water enters only at the cavities openings **106** and flows generally radially through preferably all the generally axial block walls (illustrated as **121**, **122**, **123**, **124** in FIG. **10**F) and typically also flow generally axially through radial walls (shown as **125** and **126** in FIG. **10**F). In the case of outside-in flow, the water enters only at the outer surface (**102** and **114**) and flows generally radially through the axial walls (**121**, **122**, **123**, **124**) inward to the cavities **104** and typically may also flow axially through radial walls **35**, **36** into the cavities **104**.

The block in FIGS. **10**A-F, in one preferred version and size, has a major outside diameter of 1.95 inches, a wall thickness of about 0.26 inches, and a length of about 3 inches. This results in 5.41 cubic inches of volume and a surface area substantially increased by the walls **108**, **108'** of the interior cavities **104** and walls **114** of exterior cavity slot **112**.

The filter block **200** of FIGS. **11**A-F comprises multiple generally cylindrical sub-blocks **201**, **202**, **203**, **204** or four "cores" of media that are connected together by a top plate **206** of media with openings **208** into the cavities **211**, **212**, **213**, **214**. Top plate **206** need not be, and preferably is not, a separate structure, but is instead integral with the multiple sub-blocks. In cross-section, as viewed along line B-B, one may see just two of the sub-blocks **202**, **204** and just two of the cavities **212**, **214**. Again, there is an opening/space between the sub-blocks (in this embodiment, channel **220**) that allows water access between the sub-blocks, preferably either to reach the outer surface of the sub-block portions "facing" each other for flow outside-in even in the area between the sub-blocks, or for water collection between the blocks after inside-out flow out of the sub-blocks.

Block **200** in one preferred version and size has a major outside diameter of about 1.95 inches, a length of about 3 inches, and a wall thickness of about 0.26 inches, a volume of 5.6 cubic inches, and a surface area substantially increased by the interior cavities **211**, **212**, **213**, **214**, and exterior cavity/channel **220**.

Block **300** in FIGS. **12**A-F comprises multiple (three) generally semi-cylindrical sub-blocks **301**, **302**, **303** or three "cores" of media that are connected together at their tops at top portion **306** having openings **308** into the cavities **311**, **312**, **313**. In cross-section, as viewed along line C-C, one may see just one of the sub-blocks **303** and just one of the cavities **313**. Again, there is an opening/space between the sub-blocks (in this embodiment, slot **320** with slot arms **321**, **322**, **323**) that allows water access between the sub-blocks, preferably either to reach the outer surface of the sub-block portions "facing" each other for flow outside-in even in the area between the sub-blocks, or for water collection between the blocks after inside-out flow out of the sub-blocks.

Block **300** in one preferred version and size has a major outside diameter of about 1.95 inches, a length of about 3 inches, a wall thickness of about 0.26 inches, a volume of 6.31

cubic inches, and a surface area substantially increased by interior cavities **311**, **312**, **313**, and exterior cavity **320** (slot portions **321**, **322**, **323**).

Block **400** in FIGS. **13**A-E comprises multiple (four) generally semi-cylindrical sub-blocks **401**, **402**, **403**, **404** or four "cores" of media that are connected together at their tops at top portion **406** having openings **408** into the cavities **411**, **412**, **413**, **414**. In cross-section, as viewed along line D-D, one may see just two of the sub-blocks **401**, **403**, and just two of the cavities **411**, **413**. Again, there is an opening/space between the sub-blocks (in this embodiment, slot **420** with slot arms **421**, **422**, **423**, **424**) that allows water access between the sub-blocks, preferably either to reach the outer surface of the sub-block portions "facing" each other for flow outside-in even in the area between the sub-blocks, or for water collection between the blocks after inside-out flow out of the sub-blocks.

Block **400** in one preferred version and size has a major outside diameter of about 1.95 inches, a length of about 3 inches, a wall thickness of about 0.26 inches, a volume of 6.42 cubic inches, and a surface area substantially increased by interior cavities **411**, **412**, **413**, and **414**, and exterior cavity **420** (slot arms **421**, **422**, **423**, **424**).

FIGS. **14**A-E show an activated carbon block **500** using a cylindrical structure. For the sake of comparison, the hollow cylindrical block **500** in FIGS. **14**A-E may be formed to have the same major outside diameter (about 1.95 inch), the same length (about 3 inches), and the wall thickness (about 0.26 inches) as the example sizes of blocks **100**, **200**, **300**, **400**. The hollow, cylindrical block in FIGS. **14**A-E has an ID of about 1.43 inches. One may note that, in this cylindrical block **500**, the interior surface/space substantially matches the exterior surface; that is, the inner surface is a cylinder and the outer surface is a cylinder. The block **500** does not have additional cavities or cavity surfaces, either on the interior or the exterior, to add to the fluid-accessible surface area.

FIGS. **15**A-E illustrate that one may add a "bottom" to the cylindrical block, making a standard single-cup filter block **600** having an axial cylindrical wall and a radial bottom wall. One may see that the cup in FIGS. **15**A-E may be formed to have the same major outside diameter (about 1.95 inch), the same length (about 3 inches), and the wall thickness (about 0.26 inches) as the example sizes of blocks **100**, **200**, **300**, **400**, **500**. Block **600** has an ID of about 1.43 inches. The total surface area of this block **600** is about 36.67 square inches, but the flowable surface area (minus one end surface that is typically sealed to housing or internals) is about 35.29 square inches, which is below the multi-core embodiments. One may note that, in this cup-shaped block **600**, the interior surface/space substantially match the exterior surface; that is, the inner surface is a cup-shape and the outer surface is a cup-shape. The block **600** does not have additional cavities or cavity surfaces, either on the interior or the exterior, to add to the fluid-accessible surface area.

It is clear from the examples in FIGS. **1**A-F through **13**A-E, all having the same overall diameter and overall length as the cylindrical block (FIGS. **14**A-E) and the cup-shaped block (FIGS. **15**A-E), that multiple-core activated carbon block shapes according to many embodiments of the invention will increase inlet or outlet surface area (and preferably both) for a given volume of activated carbon material and for a given filter cartridge volume, housing volume, or "package" volume. An important design feature for a filter cartridge in a gravity-flow water pitcher or tank is to minimize the total space that a cartridge or filter housing takes up (also called the filter "package" volume) inside the pitcher or tank. Therefore, embodiments of the invention that minimize the package volume, while providing excellent filtration performance and life and good flow-rates, will be particularly beneficial for said pitcher or tank applications.

FIGS. **16** A-E portray one, but not the only, embodiment of a filter block **800** that includes a brace **822** or partition dividing or extending into the indentation space. Filter block **800** is similar to filter block **100**, in FIGS. **10**A-M, except that the brace **810** extend between and connects the two sub-blocks in a portion of the indentation space. As seen to the best advantage in FIG. **16**C, this brace **810** does extend substantially all the way along the length of the sub-blocks, but there is still an indentation on each side of the brace **810** that separates/spaced the sub-blocks. Thus, it may be said that there are two indentations **821**, **822** extending into the filter block **800** (from the bottom and the side of the filter block) along a substantial amount of the length of the sub-blocks. The reinforcement of the brace **810** helps prevent the filter block sub-blocks from snapping off or otherwise being damaged, and, because of the presence of the two indentations, said brace **810** preferably does not significantly reduce fluid access to the surfaces of the indentation. The brace **810** is preferably thin and tapered, to minimize its impact (reduction) on the indentation surface area.

FIGS. **17**A-D portrays an alternative embodiment of the invented filter block **900** comprising a single cavity **911** at a first end opening into two cavities **912**, **913** part way along the length of the filter block. This filter block **900** may be described as having a single filtration unit/sub-block at said first end and two sub-blocks **901**, **902** an opposite end of the filter block **900**, wherein the cavity **911** of the first sub-block **901** is in fluid communication with the cavities **912**, **913** of the other sub-blocks **902**, **903**. Thus, this is one example of a branched cavity arrangement.

FIGS. **18**A-B portray a filter block **1000** that is that same as block **900** in FIGS. **17**A-D except that block **1000** has a glue depression ring **1026** around the top of the block. This depression may receive glue, or otherwise seal, to a housing or internals member for controlling fluid flow.

FIGS. **19** A-C portray an alternative filter block **1100** for a shorter housing, wherein the filter block **1100** and its sub-blocks **1101**, **1102** are wider (W) than they are tall (T). This block **1100** has two D-shaped cavities **1111**, **1112** in a first end and a slot **1122** (another example of an indentation) in the second, opposing end separating portions of the two sub-blocks **1101**, **1102**.

FIGS. **20**A and **20**B illustrates alternative embodiments **1200**, **1300** of multicore, multiple-sub-block filter blocks wherein multiple cavities are supplied to form the multiple sub-blocks, and indentations are also supplied to further separate the sub-blocks to provide additional fluid access to inner regions of the filter block. The indentations are provided in the form of gaps/spaced between the sub-blocks in regions generally midway along the length of the sub-blocks but not at the bottom of the sub-blocks. These filter blocks are some, but the only, embodiments that comprise indentation(s) that extend into the filter block at the other than an end of the filter. These indentations/gaps/spaces may be described as extending into a side/sides of the filter block or extending radially into the filter block, Thus, it may be seen that, in some embodiments, indentations may extend into a central region of the filter block but not into either end of an elongated filter block. It may be noted that the bottom end of filter block **1200** comprises a solid bottom plate connecting the sub-blocks, wherein, in some embodiments there may be a seam/interface between the bottom plate and the sub-blocks comprising preferably a layer of adhesive, glue, or melted and/or re-solidified binder directly connecting the bottom plate to the sub-blocks.

It may be noted that the bottom ends of the sub-blocks of filter block **1300** are preferable integrally connected with each other rather than comprising a glued or bonded seam/interface.

Many, but not all, embodiments of the multiple-sub-block sold profile filters use activated carbon and thermo-set binder, and the preferred proportions may range from about 5 up to about 70 weight percent binder, and 95 down to about 30 weight percent activated carbon plus additives. More preferable, many embodiments comprise 10-50 weight percent binder and 90 down to 50 weight percent activated carbon plus additives.

An especially preferred composition, for example, for gravity flow or low-pressure filter blocks according to embodiments of the inventions is: 30-50 wt-% binder(s), 28-52 wt-% powdered or granular activated carbon, and 18-22 wt-% lead removal media, wherein the total of the binder, activated carbon and lead removal media 100-%. Filter blocks, in the shape represented by FIGS. **10**A-N, have been made from about 40 wt-% UHMWPE binder, about 38 wt-% powdered activated carbon, and about 22 wt-% lead removal (Alusil™) media. Activated carbon size distribution such as the following was used: D10 of about 10-30 microns; D50 of about 70-100 microns; and D90 of about 170-200 microns. These blocks, made in the shape of FIGS. **10**A-N have been found to perform effectively in water filtration, including obtaining lead removal results that meet the recent NSF Standard 53 for lead in drinking water (less than 10 ppb lead, that is less than 10 ppb total of soluble and particulate lead), while also achieving a flow rate of 1 liter per 4-7 minutes flow rate of water filtration. It is noteworthy that the multiple-sub-block filter block providing this excellent performance had only about a 2 inch outer diameter and about a 3 inch axial length, comprised only binder, activated carbon and lead sorbent in a solid profile, and did not contain any ion exchange resin or zeolite (which are conventionally used in gravity flow filters for metals removal). Such performance could result a filter cartridge, for a water carafe or other gravity flow apparatus, of overall dimensions of less than 3 inches in diameter and less than 5 inches in length, for example, meeting the recent NSF Standard 53 for lead removal. The inventors also believe that this performance may be achieved, with embodiments of the multiple-sub-block filters, over a long filter life.

Embodiments presented herein, including the multi-core, multi-cavity, or multi-sub-block solid profile media, may be used in liquid filtration applications and also in air or other gaseous material filtration applications. While the filters in the drawings, and the terminology used herein, are shown or described in terms of "up" and "down," the filters are not limited to a particular orientation; various housings and internals may be used, as will be understood by one of average skill after viewing this disclosure and the accompanying drawings, that may place the filters in various orientations other than those shown.

Thus, one may see, from the above discussion of interior cavities, that the multiple sub-block form of the preferred embodiments may include, for example: a block that has multiple, connected filtration units or sub-blocks extending all along the block length; a block with a first axial end region that comprises a single filtration unit or sub-block, transitioning to a middle or second axial end region comprising multiple filtration units/sub-blocks; or a block with a first axial end region comprising multiple, connected filtration units/sub-blocks transitioning to middle or second axial end region comprising different multiple filtration units/sub-blocks.

Processing

A carbon block filter can be manufactured using conventional manufacturing techniques and apparatus. In one embodiment, the binder, carbon granules, and other actives are mixed uniformly to form a substantially homogeneous blend. The blend is then fed into a mold having an inner surface conforming to the desired outer surface of the block filter, and that has an upwardly projecting member or members that define the cavity of the resultant block filter. The mold is heated to a temperature in the range of approximately 175-205° C. The optional, but preferred, compression may take place before heating, during heating, and/or after heating. Compression, if performed, is preferably performed at a pressure of less than about 100 psi. After cooling, the resulting porous composite carbon block is removed from the mold and trimmed, if necessary.

As noted above, in the processing of the carbon block, compression can be applied in order to achieve a more consistent and stronger carbon block than can be achieved using a sintering process as commonly practiced in the porous plastics industry. Compression can facilitate good contact between powdered or granular media and binder particles by pressing the powdered media into the binder. Compression can also prevent cracking and shrinkage of the carbon block while the filter is cooling in the mold. Thus, in one embodiment of the invention, a compression that reduces the fill height of the mold in the range of approximately 0%-30% is employed. In some arrangements, the compression reduces the fill height of the mold in the range of approximately 5-20% or 10-20%. In other arrangements, the compression reduces the fill height of the mold by no more than approximately 10%. In yet another arrangement, no compression is applied.

Molding or otherwise forming the embodiments shown in FIGS. **10-13** and **16-19** may pose particular problems due to the preferred sub-block structure and the deep penetration of the cavities into the sub-blocks. Unless special adaptation is made in many embodiments, blemishes, holes, torn or destroyed sub-block walls, and/or other imperfections in the block may occur during separation of the block and the mold/tools. As a filter block with uniform flow distribution is an important object of these embodiments, such imperfections are usually not acceptable. Therefore, the embodiments shown include adaptations in the block shape, to allow for proper removal of the block from the mold or other forming tools. The adaptations may include orientation of the sub-blocks to be "clustered" around a central axis, shape and diameter of the cavities adapted to minimize thin portions extending transverse to the direction in which the block is removed from the block, and tapering/slanting of the outside surface of the block, including the exterior cavity surfaces, and/or the internal surfaces forming the interior cavities. These adaptations allow fabrication of various embodiments that achieve the objectives of a relatively large volume of media, with a low pressure drop, good flow distribution, coupled with durability and performance consistency.

When forming the embodiments shown in FIGS. **10-13** and **16-19**, the mixture of media components and binder(s) may be placed in a mold, and may optionally be compressed with a piston or weight on the mixture for example, and heated to make the binder tacky enough to stick to the media particles, thus, holding them together in a solid profile when cooled. Typically, heating in a 400-500 degree F. oven for about 30 minutes will effectively heat the mixture to reach the desired amount of binder tackiness. The optional, but preferred, compression may take place before heating, during heating, and/or after heating. The optional compression that reduces the

volume of the mixture about 10-20 percent is preferred, but this may vary and may extend to a greater or lesser range of compression.

Performance

Some embodiments include filters for use in gravity and low pressure applications that meet a specific performance range of operation defined by filter volume, defined usage lifetime, average time of filtration, and/or lead reduction ability. The nature of the filter meeting the following performance criteria is independent of the exact embodiment of the filter and thus applicable to mixed-media, carbon blocks, nonwovens, hollow fibers and other filtration formats.

FRAP Factor

In one approach, the performance range is defined by a factor accounting for all of the above listed attributes. The factor is designated the Filter Rate and Performance Factor (FRAP) Factor. Preferred filters have a FRAP Factor ranging from 0-350, preferably less than about 200, as defined by the following formula:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where:

V=volume of the filter media (cm^3),

f=average filtration unit time over lifetime L (min/liter),

c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (μg/liter) soluble lead and 30-60 ppb (μg/liter) colloidal lead greater than 0.1 μm in diameter

L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).

The filter volume (V) is defined as the volume of filtering media or active media. This equates to the hydrated bed volume for mixed media filters and the mold volume for the carbon block filters. In preferred embodiments, the volume of the filter media (V) is less than about 300 cm^3, and more preferably less than about 150 cm^3.

The average filtration unit time (f) is defined as the time it takes to filter one liter of water averaged over all filtered liters in the defined filter lifetime. In preferred embodiments, the average filtration unit time (f) is less than about 12 minutes per liter, and more preferably less than about 6 minutes per liter.

The effluent lead concentration (c_e) is the amount of total lead (soluble and colloidal) remaining in the water after filtration for the last liter of water filtered in the defined filter lifetime when the influent (source) challenge water is pH 8.5 water containing 150±15 ppb of total lead with 30±10% being colloidal lead greater than 0.1 μm in diameter.

Preferably, the source water is prepared as defined in the NSF/ANSI 53 protocol (2007). Illustrative source water specifications according to the NSF/ANSI 53 protocol (2007) are as follows:

135-165 ppb total lead content

20-40% of lead in colloidal form, size greater than 0.1 μm greater than 20% of the colloidal lead must be in the 0.1 μm to 1.2 μm size range.

Hardness, alkalinity, chlorine content and pH of the water is specified as follows:

Hardness	90-110 mg/L
Alkalinity	90-110 mg/L
Chlorine	0.25-0.75 mg/L
PH	8.3-8.6

The filter usage lifetime (L) is defined as the total number of gallons that can be effectively filtered according to claims presented by the manufacturer or seller of the filter. Typically these claims are present on the product packaging in the form of instructions to a consumer as to a quantity of water that can be filtered before the filter should be changed. The lifetime claims may also be presented in the manufacturer's or seller's advertising. Such claims typically bear some relationship to some performance attribute of the filter. Typically, filter usage lifetime claims require a substantiation process, and in some cases, a competitor may be able to challenge such claims in a judicial or non-judicial process.

During FRAP testing, the source water is gravity-fed in batches of 1 liter. Preferably, the testing is performed in the container for which the subject filter is designed.

FRAP performance testing may be conducted according to the NSF/ANSI 53 protocol. Requirements and procedures of the NSF/ANSI 53 protocol are available in a document entitled "Drinking water treatment units—Health effects", available from NSF International, 789 North Dixboro Road, P.O. Box 130140 Ann Arbor, Mich. 48113-0140, USA (Web: http://www.nsf.org), and which is herein incorporated by reference.

The FRAP factor criteria set forth herein is applicable to all embodiments of pour through filters including but not limited to mixed media (carbon and ion exchange resin), carbon blocks with any type and size of carbon and binder material with and without lead sorbent. Other embodiments of the present invention include alternate filtration techniques such as membranes, nonwovens, depth media, nanoparticles and nanofibers, ligands, etc.

FIGS. **21**-**23** are graphical representations of filter FRAP factors as a function of filtration unit time and volume, lead reduction, and filter lifetime, respectively.

FIG. **21** is a chart **2100** graphically depicting the FRAP factor as a function of filtration unit time for filters having three different volumes (V). As shown, the larger the volume and longer filtration unit time (f), the higher the FRAP factor.

FIG. **22** is a chart **2200** graphically depicting the FRAP factor as a function of filtration unit time for filters relative to lead reduction performance. As shown, the better the lead removal and shorter the filtration unit time (f), the lower the FRAP factor.

FIG. **23** is a chart **2300** graphically depicting the FRAP factor as a function of filtration unit time for filters relative to lead reduction performance. As shown, the shorter the filter lifetime (L) and longer the filtration unit time (f), the higher the FRAP factor.

Several gravity fed carbon blocks and mixed media filters have been tested for flow rate and lead reduction capability against the defined lead challenge water. Filters tested include several formulations of carbon blocks along with commercially available mixed media filters produced by BRITA® and PUR®. Based on the results from testing, the FRAP factors were calculated for each filter and reported below. No mixed media filters tested met the claimed FRAP factor range due to their inability to remove particulate lead. The formulations of gravity fed carbon blocks disclosed are unique in there ability to meet the required FRAP factor. The "Examples" below include many examples of gravity flow carbon blocks that have a FRAP factor of less than 350. It is

not believed that any currently-marketed gravity-flow filters have a FRAP factor of less than 350.

Preferably, a lead concentration in a final liter of effluent water filtered by the filter is less than about 10 μg/liter after approximately 151 liters (40 gallons) of source water filtration, the source water having a pH of 8.5 and containing 135-165 parts per billion total lead with 30-60 ppb thereof being colloidal lead greater than 0.1 μm in diameter, fed in batches of about one liter with a head pressure of between approximately 0.1 and 1.0 psi.

EXAMPLES

Embodiments of the present invention are further illustrated by the following examples. The examples are for illustrative purposes only and thus should not be construed as limitations in any way.

All scientific and technical terms employed in the examples have the same meanings as understood by one with ordinary skill in the art. Unless specified otherwise, all component or composition percentages are "by weight," e.g., 30 wt %.

Example 1

As noted above, various sizes and types of media may be used. Many, but not all, embodiments may use activated carbon particles and thermo-set binder. In multiple-core filter blocks as illustrated in FIGS. **10-13** and **16-19**, illustrative proportions of the various filter materials may be in the range of 5-45 weight percent binder, 95-35 weight percent activated carbon particles such as granular activated carbon "GAC" and, more preferably, 20-40 weight percent binder and 60-30 weight percent activated carbon particles such as GAC. A lead or arsenic sorbent may be added, typically in place of a portion of the GAC.

Example 2

In multiple-core filter blocks as illustrated in FIGS. **10-13** and **16-19**, examples of compositions are: 45-80 weight %, 10-15 weight % lead sorbent (such as Alusil™ 40-70, or others); and 10-40 weight % binder particles. The activated carbon may be 80×325 mesh. An activated carbon with size distribution such the following, for example, may be used: D10 10-20 microns; D50 80-90 microns; and D90 180-200 microns.

Examples 3A-E

Gravity fed carbon blocks have been formulated in cylindrical multiple-core blocks (referred to as "CMC" blocks) having a shape as shown in FIGS. **10**A-F. The blocks shapes provide large surface areas in the given volumes. The blocks are comprised of activated carbon in powder or fiber form, low melt flow high molecular weight binder, and a lead sorbent material.

The CMC blocks in this example have a volume of approximately 80 cm^3 with and internal surface area of 265.7 cm^2. The CMC blocks tested have masses ranging from 35 to 38 g.

The CMC blocks were evaluated for flow rate performance and lead reduction performance against colloidal lead challenge water prepared as defined in NSF/ANSI 53 Protocol (2007). In addition to testing the gravity fed carbon blocks, several mixed media filters, containing granular activated carbon and ion exchange resin, were tested for comparative performance.

The following Table lists some of the formulations used in the following examples.

TABLE 1

Filter Multiple Core (FIGS. 10A-F):	Lead Sorbent Type	Carbon Type	% Lead Sorbent	% Carbon	% Binder	Fill Weight
PA3-5	Alusil ™ [1]	PAC [2]	20	40	40	36.5
PA3-8	Alusil	PAC	20	40	40	36.0
PT3-4	ATS [3]	PAC	20	40	40	39.5
PT3-6	ATS	PAC	20	40	40	39.5
PT3-5 alternate housing	ATS	PAC	20	40	40	39.5
PT3-11	ATS	PAC	20	40	40	40.0
PT3-13	ATS	PAC	20	40	40	40.0
PT3-51	ATS	PAC	20	40	40	40.0
PT3-53	ATS	PAC	20	40	40	40.0
P2-8	N/A	PAC	0	60	40	40.0
P2-6	N/A	PAC	0	60	40	40.0

[1] Alusil - Selecto Scientific, Inc., 3980 Lakefield Court, Suwanee, GA 30024 Sodium Alumina silicate lead sorbent with diameter 40-70 μm.
[2] PAC - powder activated carbon with size 80 × 325 mesh.
[3] ATS Engelhard corporation 101 Wood Ave. Iselin, NJ 08830 Titanium Silicate zeolite lead sorbent with 25-30 μm diameter.

Example 3A

CMC blocks formulated with powder carbon fiber in varying ratios with lead sorbent and 40% ultra high molecular weight polyethylene binder with a melt flow less than 1.0 g/10 min. as determined by ASTM D 1238 at 190° C. and 15 kg load were tested by the method described in Example 3A. The results are shown in Table 2. PA1 blocks contained 40 wt. % binder, 50 wt. % powder carbon fiber (HMM 80×320), and 10 wt. % Alusil™ lead sorbent. PA2 blocks contained 40 wt. % binder, 45 wt. % powder carbon fiber, and 15 wt. % Alusil™ lead sorbent. PA3 blocks contained 40 wt. % binder, 40 wt. % powder carbon fiber, and 20 wt. % Alusil™ lead sorbent. PT2 blocks contained 40 wt. % binder, 50 wt. % powder carbon fiber, and 10 wt. % ATS lead sorbent. All blocks were tested with unrestricted flow through the filter except PT3-4. PT3-4 was tested in an alternate housing set-up in which the exit point for water from the filter was moved from the bottom of the filter towards the top. This restricted the flow rate in the block and forced the water to have extended contact with the block.

FIG. **24** illustrates a representative configuration of a filter set-up 2400 having unlimited flow. In this example, a filter block **2402** is present in a housing **2404**. Flow is unrestricted through the block **2402** and exits at the bottom of the housing **2404**. There is no long term contact between the block **2402** and filtered water.

FIG. **25** depicts a representative configuration of a filter set-up 2500 with a filter block **2502**, where the exit point for water from the housing **2504** is moved from the bottom of the housing **2504** towards the top. In this case, the flow is restricted. Water is forced to stay in contact with the block **2502** longer as the housing **2504** fills with water before it exits at the upper holes.

Lead challenge water was formulated with 150 ppb lead with 45 ppb in colloidal form (size >0.1 microns). The colloidal lead is a challenge for gravity fed filters to remove whilst maintaining rapid filtrations rates (<7 min./liter). The flow rates were measured by filling a liter reservoir of a standard Brita® pitcher with the lead challenge water. The time required for the water to filter through the filtration

material was recorded and the resulting effluent water was tested as indicated in Table 2. The filtrate effluents were collected after 3, 76, 151, 227, 273, and 303 liters of challenge water had been filtered. This corresponds to 2, 50, 100, 150, 180, and 200% of filter life. The total lead concentrations reported includes both colloidal and particulate form. The lead concentration was measured using an atomic adsorption spectrometer. The concentration of lead in the effluent and influent (challenge) water are displayed in ppb. Effluent values less than 10 ppb are desirable.

TABLE 2

Liters Filtered	3 L	76 L	151 L	227 L	273 L	303 L	average
PA3-5							
Effluent Total Pb Conc. (ppb)	8.68	7.94	9.53	9.05	10.95	11.87	9.7
Influent Total Pb Conc. (ppb)	161.9	153.5	149.7	158.9	162.6	156.2	157
Influent Sol. Pb Con. (ppb)	112.8	108.8	106.7	116.1	112.4	109.8	
% Colloidal Particulate Influent	30.3	29.1	28.7	26.9	30.9	29.7	29
% Total Pb Removed	94.6	94.8	93.6	94.3	93.3	92.4	
Flow Rate (min./liter)	0:05:00	0:04:32	0:04:30	0:03:28	0:03:28	0:03:30	0:04:09
PA3-8							
Effluent Total Pb Conc. (ppb)	7.24	5.86	7.45	7.01	8.21	8.47	7.4
Influent Total Pb Conc. (ppb)	166.7	156.6	150.2	169.8	165.3	161.3	162
Influent Sol. Pb Con. (ppb)	115.9	111.9	104.9	116.6	112.4	109	
% Colloidal Particulate Influent	30.5	28.5	30.2	31.3	32.0	32.4	31
% Colloidal Particulate >1.2 microns	39.2	31.8	23.0				31
% Total Pb Removed	95.7	96.3	95.0	95.9	95.0	94.7	
Flow Rate (min./liter)	0:04:48	0:04:18	0:04:18	0:03:34	0:03:35	0:03:39	0:04:03
PT3-4							
Effluent Total Pb Conc. (ppb)	6.76	5.42	6.25	6.67	7.84	8.55	6.9
Influent Total Pb Conc. (ppb)	163.3	157.2	150	166.1	161.2	160.1	160
Influent Sol. Pb Con. (ppb)	114.5	108.2	108.1	116	114.1	112.6	
% Colloidal Particulate Influent	29.9	31.2	27.9	30.2	29.2	29.7	30
% Total Pb Removed	95.9	96.6	95.8	96.0	95.1	94.7	
Flow Rate (min./liter)	0:05:19	0:04:31	0:04:29	0:03:39	0:03:36	0:03:37	0:04:13
PT3-6							
Effluent Total Pb Conc. (ppb)	7.09	11.37	13.29	14.17	14.35	14.62	12.5
Influent Total Pb Conc. (ppb)	166.8	158.3	151.3	169.5	182.8	168.6	166
Influent Sol. Pb Con. (ppb)	118.7	111.5	106	115.8	113.5	112	
% Colloidal Particulate Influent	28.8	29.6	29.9	31.7	37.9	33.6	32
% Colloidal Particulate >1.2 microns				36.5	53.1	42.0	44
% Total Pb Removed	95.7	92.8	91.2	91.6	92.1	91.3	
Flow Rate (min./liter)	0:20:19	0:04:22	0:04:08	0:03:02	0:03:06	0:03:05	0:03:51
PT3-4 - alternate housing							
Effluent Total Pb Conc. (ppb)	1.17	5.08	1.25	3.75	5.08	6.43	3.8
Influent Total Pb Conc. (ppb)	127.5	154.6	135.9	131.4	126	131.8	135
Influent Sol. Pb Con. (ppb)	106.7	109.6	105.6	90.6	88.6	84.6	
% Colloidal Particulate Influent	16.3	29.1	22.3	31.1	29.7	35.8	27
% Colloidal Particulate >1.2 microns			39.3	25.5	17.1	23.5	26
% Total Pb Removed	99.1	96.7	99.1	97.1	96.0	95.1	
Flow Rate (min./liter)	0:06:20	0:06:02	0:05:26	0:05:28	0:05:42	0:05:31	0:05:36
PT3-11							
Effluent Total Pb Conc. (ppb)	7.69	6.94	8.46	5.42	3.34	4.21	6.0
Influent Total Pb Conc. (ppb)	181.6	172.1	164.5	148.5	142	134.4	157
Influent Sol. Pb Con. (ppb)	133	119.7	118.6	98.9	87.9	84.8	
% Colloidal Particulate Influent	26.8	30.4	27.9	33.4	38.1	36.9	32
% Total Pb Removed	95.8	96.0	94.9	96.4	97.6	96.9	
Flow Rate (min)	0:04:32	0:04:20	0:04:23	0:03:54	0:03:54	0:03:49	0:04:09
PT3-13							
Effluent Total Pb Conc. (ppb)	8.78	7.73	9.2	3.7	4.16	4.62	6.4
Influent Total Pb Conc. (ppb)	185	170.5	167.5	145.6	133	127.1	155
Influent Sol. Pb Con. (ppb)	120.9	108.2	116.2	97.9	91	85.6	
% Colloidal Particulate Influent	34.6	36.5	30.6	32.8	31.6	32.7	33
% Total Pb Removed	95.3	95.5	94.5	97.5	96.9	96.4	
Row Rate (min)	0:04:25	0:04:11	0:04:15	0:03:57	0:03:49	0:03:52	0:04:04

All CMC blocks exhibited fast flow rates around 4 min./liter with good lead reduction performance. Two blocks reduce lead to below 10 ppb for 200% of filter life. The block tested with alternate housing showed improved lead reduction performance but also had slow flow rates, averaging 5:36 min./liter. The flow rate in the alternate block can be tuned by changing the size, number and location of the water exit holes.

Powder-carbon CMC blocks with a higher fill weight of material than the blocks above have also been tested. While the results are not shown, they demonstrate slightly slower flow rates. The Alusil™ containing blocks with higher fill weights exhibit decreased lead removal ability compared to the lower fill weight blocks. This may be due to inconsistent packing in the filter mold resulting in areas of high and low compaction. This would result in areas of preferential flow.

Areas with high flow rates would be used up more quickly. The ATS containing blocks performed better at the higher fill weight. This may be due to the higher density of ATS. The ATS containing formula may require more material to achieve the same compression as the Alusil™ blocks.

Example 3B

Mixed media filters containing granular carbon and ion exchange resin were tested by the method described in Example 3A. The results are shown in Table 3. The filters tested were the current BRITA® gravity-flow mixed media filter, the BRITA® Germany MAXTRA® gravity-flow mixed media filter, and the Proctor and Gamble PUR® 2-stage gravity-flow filter with pleated microfilter. All filters were prepped according the manufactures directions, which included 15 min. of soaking. All filters were tested in the pitcher provided by the manufacturers.

TABLE 3

Liters Filtered	3 L	76 L	151 L	227 L	273 L	303 L	average
Brita Granular							
Effluent Total Pb Conc. (ppb)	39.30	40.86	42.21	42.50	46.15	41.27	42.05
Influent Total Pb Conc. (ppb)	170.10	160.00	182.70	171.90	167.60	164.70	169.50
Influent Sol. Pb Con. (ppb)	118.30	109.90	107.60	117.50	116.90	115.40	
% Colloidal Particulate Influent	30.5%	31.3%	41.1%	31.6%	30.3%	29.9%	32.5%
% Total Pb Removed	76.9	74.5	76.9	75.3	72.5	74.9	
Flow Rate (min./liter)	0:02:50	0:06:05	0:05:28	0:05:59	0:06:17	0:06:33	0:05:32
Maxtra 55:45							
Effluent Total Pb Conc. (ppb)	36.43	40.85	43.77	45.46	46.04	45.59	43.02
Influent Total Pb Conc. (ppb)	170.00	159.90	153.20	165.80	164.10	166.60	163.27
Influent Sol. Pb Con. (ppb)	119.40	110.00	104.50	113.80	115.00	113.00	
% Colloidal Particulate Influent	29.8%	31.2%	31.8%	31.4%	29.9%	32.2%	31.0%
% Total Pb Removed	78.6	74.5	71.4	72.6	71.9	72.6	
Flow Rate (min./liter)	0:04:41	0:04:51	0:04:51	0:04:39	0:04:40	0:04:42	0:04:44
PUR 2stage							
Effluent Total Pb Conc. (ppb)	4.85	26.06	30.24	NA	NA	NA	20.38
Influent Total Pb Conc. (ppb)	170.60	159.00	152.20	NA	NA	NA	160.60
Influent Sol. Pb Con. (ppb)	117.50	113.20	110.70	NA	NA	NA	
% Colloidal Particulate Influent	31.1%	28.8%	27.3%	NA	NA	NA	29.1%
% Total Pb Removed	97.2	83.6	80.1				
Flow Rate (min./liter)	0:08:15	0:22:59	0:16:53	NA	NA	NA	0:16:02
PUR 2stage							
Effluent Total Pb Conc. (ppb)	2.89	32.38	38.60	NA	NA	NA	24.62
Influent Total Pb Conc. (ppb)	161.10	165.20	158.00	NA	NA	NA	161.43
% Total Pb Removed	98.2	80.4	75.6				
Flow Rate (min./liter)	0:08:13	0:12:15	0:12:30	NA	NA	NA	0:18:52
PUR 2stage							
Effluent Total Pb Conc. (ppb)	2.95	32.56	39.56	NA	NA	NA	25.02
Influent Total Pb Conc. (ppb)	162.20	138.70	149.40	NA	NA	NA	150.10
% Total Pb Removed	98.2	76.5	73.5				
Flow Rate (min./liter)	0:07:35	0:12:41	0:10:58	NA	NA	NA	0:15:29

All mixed media filters tested fail to adequately reduce total lead concentrations by 50% (75 liters) of filter life. The mixed media filters with the pleated micro filter screen have passing lead removal at 3 liters but then fail at higher quantities. The pleated micro filter results in slow flow rates with averages great than 15 min./liter over the lifespan of the filter (151 liters).

Example 4

Gravity fed carbon blocks were formed in two shapes: a multiple-core block (referred to as "CMC" block) having a shape as shown in FIGS. **10**A-F, and a cylindrical block as shown in FIGS. **14**A-E. The blocks are comprised of activated

carbon in powder or fiber form, low melt flow high molecular weight binder of 1.0 g/10 min. as determined by ASTM D 1238 at 190° C. and 15 kg load, and a lead sorbent material. For the CMC block the surface area in contact with unfiltered water is defined as the interior portion and the upper surface above the lip (**116**, FIG. **10**A). For the cylindrical block, the surface area in contact with unfiltered water is defined as the exterior surface, but not the upper or lower end surfaces.

TABLE 4

	CMC Block (FIGS. 10A-F)		Cylindrical Block (FIGS. 14A-E)	
Shape Units	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3
volume of block	5.41	88.67	9.21	151.00
surface area in contact with unfiltered water	13.90	89.64	24.66	159.44

TABLE 4-continued

	CMC Block (FIGS. 10A-F)		Cylindrical Block (FIGS. 14A-E)	
Shape Units	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3
Wall thickness	0.26	0.66	0.52	1.33
fill weight low	36.00	36.00		
fill weight high	43.00	43.00		
block density low	6.65	0.41	6.56	0.40
block density high	7.95	0.48	7.70	0.47

TABLE 4-continued

	CMC Block (FIGS. 10A-F)		Cylindrical Block (FIGS. 14A-E)	
Shape Units	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3	in, in^2, g, g/in^2	cm, cm^3, g, g/cm^3
surface area in contact with unfiltered water/volume	2.57	1.01	2.68	1.05

As noted in the Table above, the CMC blocks provide large surface areas in the given volumes.

Example 5

The following Table lists FRAP Factor Data for five filter shapes/types, the filters having formulations as presented above in Examples 3A-E, except as noted. Within the multiple-core blocks (FIGS. **10**A-F), three different formulations are displayed (PA3, PT3, P2). Within the multiple-core blocks a wide range of preferred FRAP factors are demonstrated, ranging from 16.6 up to 223.1 FRAP.

Also shown are cylindrical filters. The mixed media filters fall above the preferred FRAP range (0-350).

TABLE 5

	L (gallons)	f (min/liter)	V (cm^3)	C_e (mg/liter)	FRAP Factor
Filter Multiple-Core:					
PA3-5	40	4.6	89	9.5	58.6
PA3-8	40	4.4	89	7.5	45.7
PT3-4	40	4.2	89	6.3	38.7
PT3-6	40	4.6	89	13.3	78.5
PT3-4 alternate housing	40	4.6	89	1.3	16.6
PT3-11	40	4.4	89	8.5	51.2
PT3-13	40	4.2	89	9.2	52.7
PT3-51	40	5.7	89	3.8	36.2
PT3-53	40	5.1	89	2.3	24.2
P2-8 lead sorbent free	40	3.4	89	52.8	208.4
P2-6 lead sorbent free	40	2.3	89	87.1	223.1
Cylindrical Block:					
Block 1	40	17.0	151	9.2	357.7
Block 2	40	9.9	151	14.6	308.2
Mixed Media:					
Brita Granular	40	5.5	128	42.2	386.7
German Maxtra	40	4.9	145	43.8	402.3
Pur 2 stage w/timer	40	16.0	141	30.2	911.4
Pur 2 stage w/timer	40	10.4	141	36.6	706.8
Pur 2 stage w/timer	40	11.0	141	38.6	785.9

FIGS. **26** and **27** are charts **2600**, **2700** depicting the FRAP ratings as presented in Table 5 for mixed media filters currently on the market along with cup-shaped and multiple core gravity flow carbon blocks as a function of filtration unit volume and lead reduction performance, respectively. As shown, the multiple-core filters all had FRAP factors below 350, while the mixed media and cylindrical filters had FRAP factors above 350.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A gravity-fed water filter, comprising:

filter media including at least activated carbon and a lead scavenger;

wherein the filter achieves a Filter Rate and Performance (FRAP) factor of about 350 or less according to the following formula:

$$FRAP = \frac{[V * f * c_e]}{[L * 2]}$$

where:

V=volume of the filter media (cm^3),

f=average filtration unit time over lifetime L (min/liter),

c_e=effluent lead concentration at end of lifetime L when source water having a pH of 8.5 contains 90-120 ppb (μg/liter) soluble lead and 30-60 ppb (μg/liter) colloidal lead greater than 0.1 μm in diameter, and

L=filter usage lifetime claimed by a manufacturer or seller of the filter (gallons).

2. The water filter as recited in claim **1**, wherein the filter achieves a FRAP factor of less than about 200.

3. The water filter as recited in claim **1**, wherein the volume of the filter media (V) is less than about 300 cm^3.

4. The water filter as recited in claim **3**, wherein the volume of the filter media (V) is less than about 150 cm^3.

5. The water filter as recited in claim **1**, wherein the average filtration unit time (f) is less than about 12 minutes per liter.

6. The water filter as recited in claim **5**, wherein the average filtration unit time (f) is less than about 6 minutes per liter.

7. The water filter as recited in claim **1**, wherein the filter media is present in the form of a block.

8. The water filter as recited in claim **7**, further comprising a binder material interspersed with particles of the activated carbon.

9. The water filter as recited in claim **8**, wherein the binder material has a melt index that is less than 1.8 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load.

10. The water filter as recited in claim **8**, wherein the binder material has a melt index that is about 1.0 g/10 min as determined by ASTM D 1238 at 190° C. and 15 kg load.

11. The water filter as recited in claim **7**, wherein the filter fits within a container having a volume of less than about 20 in^3.

12. The water filter as recited in claim **7**, wherein the filter fits within a container having a volume of less than about 10 in^3.

13. The water filter as recited in claim **7**, wherein the block comprises multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining a cavity for receiving fluid.

14. The water filter as recited in claim **7**, wherein the block comprises multiple sub-blocks, each of the sub-blocks comprising filter media walls surrounding and defining on four sides a cavity for receiving fluid.

15. The water filter as recited in claim **13**, wherein the block has an exterior space, gap, or recess between at least a portion of the multiple sub-blocks.

16. The water filter as recited in claim **7**, wherein the block has an open top for receiving unfiltered water into a cavity thereof.

17. The water filter as recited in claim **7**, wherein a median sidewall thickness of the block is less than about 0.6 inch.

18. The water filter as recited in claim **7**, wherein a median sidewall thickness of the block is less than about 0.4 inch.

19. The water filter as recited in claim **7**, wherein a structure of the block is characterized by having been compressed no more than 10% by volume during fabrication of the filter.

20. The water filter as recited in claim **1**, wherein the filter media comprises primarily particles that are not bound together.

21. The water filter as recited in claim **1**, wherein the filter media is present in the form of granular carbon.

22. The water filter as recited in claim **1**, wherein the lead scavenger is a zirconia oxide or hydroxide.

23. A gravity-flow system for filtering water, comprising:

a container having a source water reservoir than can hold source water and a filtered water reservoir that can hold filtered water;

a cartridge in communication with both the source water reservoir and the filtered water reservoir, the cartridge providing a path through which water can flow from the source water reservoir to the filtered water reservoir; and

a filter as recited in claim **1** disposed within the cartridge.

24. The gravity-flow system as recited in claim **23**, wherein the cartridge has an aperture through a sidewall thereof for allowing at least egress of air into the filtered water reservoir.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,167,141 B2
APPLICATION NO. : 12/207284
DATED : May 1, 2012
INVENTOR(S) : Elizabeth L. Knipmeyer et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

In Column 27, Line 49, please delete "Examples 3A-E" and insert --Examples 3A-3B--.

In Column 33, Line 18, please delete "Examples 3A-E" and insert --Examples 3A-3B--.

In Column 33, Line 22, please delete "16.6" and insert --6.7-- and delete "223.1" and insert --222.9--.

In Column 33, under "TABLE 5", row 1, under table column labeled "FRAP Factor", please delete "58.6" and insert --48.6--.

In Column 33, under "TABLE 5", row 2, under table column labeled "FRAP Factor", please delete "45.7" and insert --36.7--.

In Column 33, under "TABLE 5", row 3, under table column labeled "FRAP Factor", please delete "38.7" and insert --29.4--.

In Column 33, under "TABLE 5", row 4, under table column labeled "FRAP Factor", please delete "78.5" and insert --68.1--.

In Column 33, under "TABLE 5", row 5, under table column labeled "FRAP Factor", please delete "16.6" and insert --6.7--.

In Column 33, under "TABLE 5", row 6, under table column labeled "FRAP Factor", please delete "51.2" and insert --41.6--.

In Column 33, under "TABLE 5", row 7, under table column labeled "FRAP Factor", please delete "52.7" and insert --43.0--.

Signed and Sealed this
Eleventh Day of January, 2022

Drew Hirshfeld
Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office

In Column 33, under “TABLE 5”, row 8, under table column labeled “FRAP Factor”, please delete “36.2” and insert --24.1--.

In Column 33, under “TABLE 5”, row 9, under table column labeled “FRAP Factor”, please delete “24.2” and insert --13.0--.

In Column 33, under “TABLE 5”, row 10, under table column labeled “FRAP Factor”, please delete “208.4” and insert --199.7--.

In Column 33, under “TABLE 5”, row 11, under table column labeled “FRAP Factor”, please delete “223.1” and insert --222.9--.

In Column 33, under “TABLE 5”, row 12, under table column labeled “FRAP Factor”, please delete “357.7” and insert --295.2--.

In Column 33, under “TABLE 5”, row 13, under table column labeled “FRAP Factor”, please delete “308.2” and insert --272.8--.

In Column 33, under “TABLE 5”, row 14, under table column labeled “FRAP Factor”, please delete “386.7” and insert --371.4--.

In Column 33, under “TABLE 5”, row 15, under table column labeled “FRAP Factor”, please delete “402.3” and insert --389.0--.

In Column 33, under “TABLE 5”, row 16, under table column labeled “FRAP Factor”, please delete “911.4” and insert --851.6--.

In Column 33, under “TABLE 5”, row 17, under table column labeled “FRAP Factor”, please delete “706.8” and insert --670.9--.

In Column 33, under “TABLE 5”, row 18, under table column labeled “FRAP Factor”, please delete “785.9” and insert --748.4--.

CERTIFICATE OF CONFIDENTIAL MATERIAL

This brief contains 0 unique words (including numbers) marked confidential.

Dated: March 15, 2024

/s/ Deanne E. Maynard
Deanne E. Maynard

CERTIFICATE OF COMPLIANCE

The foregoing filing complies with the relevant type-volume limitation of the Federal Rules of Appellate Procedure and Federal Circuit Rules because the filing has been prepared using a proportionally spaced typeface and includes 11,787 words, excluding the parts of the brief exempted by the Rules.

Dated: March 15, 2024 /s/ Deanne E. Maynard

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